AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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NASA SP-7011(19)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Information System during December, 1965

Scientific and Technical Information Division
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. JANUARY 1966

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In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis will be placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion. The contents of this issue are comprised of abstracts that were prepared by the three contributing organizations.

Each entry consists of a standard citation accompanied by its abstract. It is included in one of three groups of references that appear in the following order:

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a continuing bibliography JANUARY 1966

STAR ENTRIES

N65-34752 Joint Publications Research Service, Washington, D. C.
VARIATION PRINCIPLES IN THE BEHAVIOR OF LIVE ORGANISMS
G. A. Golitsyn *In its* News of the Acad. of Sci. USSR, Dept. of Tech. Sci., Tech. Cybernetics, No. 3, 1965 14 Sep. 1965 p 285–291 refs (See N65-34725 23-34) CFSTI: $6.00

A special case of the behavior of a fully trained living organism in a complex situation with several different goals, is investigated. It is shown that in this case its behavior must be subject to three basic principles: the Anoxin exclusion law, the Ukhtomskiy dominant principle, and the principle of least displeasure. Author

N65-34775# Joint Publications Research Service, Washington, D. C.
SOVIET RESEARCH IN SPACE
13 Sep. 1865 31 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 4, Jul.–Aug. 1965 p 481–499
(JPRS-31958; TT-65-32452) CFSTI: $2.00
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1. THE PROBLEM OF REACTIVITY IN SPACE MEDICINE V. V. Parin, P. V. Vail'yev, and V. Ye. Belay p 1–16 refs (See N65-34776 23-04)

2. REACTIONS OF THE CARDIOVASCULAR AND RESPIRATORY SYSTEMS OF COSMONAUTS UNDER CONDITIONS OF ORBITAL FLIGHT IN THE SPACECRAFT "VOSKHOD-1" P. V. Vasil'yev, A. D. Voskresenskiy, I. I. Kas'yan, D. G. Maksimov, I. D. Pestov et al p 17–28 refs (See N65-34777 23-04)

N65-34776 Joint Publications Research Service, Washington, D. C.
THE PROBLEM OF REACTIVITY IN SPACE MEDICINE
V. V. Parin, P. V. Vail'yev, and V. Ye. Belay *In its* Soviet Res. in Space 13 Sep. 1965 p 1–16 refs (See N65-34775 23-04)

The influence of environmental factors such as diet, temperature, barometric pressure, gas composition of inhaled air, physical, neuro-psychic factors etc. upon the individual physiological reactivity of animals and man is investigated. Changes in the reactivity of albino mice, rats, rabbits, and dogs were produced by administering various pharmacological agents prior to subjecting the animals to G-forces, and the optimum dosage of each agent for increasing significantly constitutional resistance to the effect of G-forces was studied. The results were encouraging and indicate that tolerance to the effects of G-forces can be increased by changing constitutional reactivity by means of pharmacological agents. Results also indicate that under the influence of G-forces there are changes in the sensitivity of an organism to a number of pharmacological agents (narcotics, cardiac glycosides, vasodilating and vasoconstrictive agents, and others). L.S.

N65-34777 Joint Publications Research Service, Washington, D. C.
REACTIONS OF THE CARDIOVASCULAR AND RESPIRATORY SYSTEMS OF COSMONAUTS UNDER CONDITIONS OF ORBITAL FLIGHT IN THE SPACECRAFT "VOSKHOD-1"
P. V. Vasil'yev, A. D. Voskresenskiy, I. I. Kas'yan, D. G. Maksimov, I. D. Pestov et al *In its* Soviet Res. in Space 13 Sep. 1965 p 17–28 refs (See N65-34775 23-04)

Electrocardiogram (EKG), phonocardiogram (PKG), kinetocardiographic, and seismocardiographic (SKG) data on cosmonauts were processed from telemetric recordings obtained from Voskhod-1 to determine the reactions of the cardiovascular and respiratory systems of the cosmonauts during the orbital flight. The dynamics of pulse and respiration rates, and of EKG and SKG indices during flight revealed some individual distinctions, but on the whole were similar to the dynamics of analagous indices of cosmonauts in previous flights, and indicated no disturbances in cardiovascular and respiratory systems. Changes in R-R variation coefficients and respiratory pauses from orbit to orbit generally coincided in time and direction, and the dynamics of pulse fluctuation and time related characteristics of the respiratory cycle appear to reflect changes in the cosmonauts general condition during the process of adaption to orbital flight and to weightlessness. L.S.

N65-34868# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EFFECT OF GAMMA-RAYS AND VIBRATION ON THE PHYSICOCHEMICAL PROPERTIES OF RED BLOOD CORPUSCLES
Yu. A. Kriger and Ye. A. Sverdlova 5 Aug. 1965 10 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR, v. 160, no. 3, 1965 p 713–716
(FTD-TT-65-585/1+2+4; AD-619329)

The effect of gamma-radiation and vibration on dielectric and osmotic properties, and the cation balance of erythrocytes were investigated. Experiments were conducted on whole human blood and on 25% suspension of erythrocytes. The results of measuring dispersions of ohmic and capacitance components of summary erythrocyte resistance showed that

neither the irradiation of erythrocytes in whole blood by a dosage of 80 kr, nor the subsequent effect of vibration produced any changes in characteristics in comparison to the control. In the experiments of irradiating and vibrating suspensions of erythrocytes in a physiological solution there was noticed a divergence in values of volumetric indices, observed visually and calculated theoretically. Measurement of a potassium yield from the erythrocytes was conducted within 5 to 7 hours after the effect of radiation and subsequent vibration. It was evident that with an increase in radiation dosage, the yield of potassium from the erythrocytes increased considerably. It was shown that vibration does not intensify the yield of potassium in the control or in the experiment. R.W.H.

N65-34895# Indiana Univ., Bloomington.
THE INFLUENCES OF SEPARATIONS AND LUMINANCES OF NEIGHBORING INDUCING FIELDS UPON THE FOVEAL CRITICAL FLICKER FREQUENCY
Constantine Anthony Ricciardi (M.S. Thesis) Sep. 1965 50 p refs
(AD-618697)

The effects of non-contiguous inducing fields, i.e. segmented fields, of increasing light intensity upon the foveal fusion frequency threshold are investigated. Emphasis is placed on the determination of: (1) how, and at what intensity levels, the maximal critical fusion frequency (C.F.F.) peaks shift; (2) changes in the magnitude of the C.F.F. maxima; and (3) the rate at which changes in C.F.F. diminish. An analogy is made between the psychophysical results of the study and the findings of electrophysiological investigations concerning lateral inhibitory interaction within the retina. D.T.

N65-34941 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INFLUENCE OF SPACEFLIGHT FACTORS ON PHYSIOLOGICAL PROCESSES IN THE GERMINATION OF SEEDS OF CERTAIN HIGHER PLANTS
L. K. Gordon, T. S. Kanter, V. V. Antipov, and V. G. Vysotskiy *In its* Cosmic Res., Vol. 3, No. 3, 18 Aug. 1965 p 215–224 refs (See N65-34925 23-30)

It has been shown that the complex of factors operating in spaceflight influences the meristem tissues of plant embryos. The changes that occur in these tissues do not always disturb the germination and sprouting of the seeds. Some increase in polyphenol oxidase and cytochrome oxidase activity was detected histochemically in experimental seeds. Author

N65-34942 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INFLUENCE OF SPACEFLIGHT CONDITIONS ABOARD THE VOSTOK 5 AND VOSTOK 6 SPACECRAFT ON THE PRIMORDIAL-ROOT CHROMOSOMES OF EMBRYOS IN SEEDS OF CERTAIN HIGHER PLANTS
N. L. Delone, N. A. Rudneva, and V. V. Antipov *In its* Cosmic Res., Vol. 3, No. 3 18 Aug. 1965 p 225–238 refs (See N65-34925 23-30)

A study was made of the influence of spaceflight conditions on the chromosomes of a number of higher plants whose seeds had been carried on the Vostok 5 and Vostok 6 spacecraft. Some increase in the percentage of chromosome was detected in the radicle cells, together with changes in the ratios of the various types of rearrangements as compared with the control. Author

N65-34943 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
STUDY OF PHAGE PRODUCTION OF E. COLI K-12 (λ), INDUCED UNDER THE CONDITIONS OF THE FLIGHTS MADE BY THE VOSTOK 3 AND VOSTOK 4 SPACECRAFT
N. N. Zhukov-Verezhnikov, I. N. Mayskiy, A. P. Pekhov, N. I. Rybakov, G. P. Tribulev et al *In its* Cosmic Res., Vol. 3, No. 3 18 Aug. 1965 p 239–245 refs (See N65-34925 23-30)

A statistically reliable inducing effect of spaceflight factors on the lysogenic bacterium E. coli K-12 (λ) was detected in experiments on the spacecraft Vostok 3 and Vostok 4. The effect was more pronounced in the biological specimens exposed on the spacecraft Vostok 3. Author

N65-34944 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INVESTIGATION OF THE BIOLOGICAL EFFECT OF SPACEFLIGHT FACTORS USING LYSOGENIC BACTERIA IN EXPERIMENTS ON THE VOSTOK 5 AND VOSTOK 6 SPACECRAFT
N. N. Zhukov-Verezhnikov, I. N. Mayskiy, A. P. Pekhov, V. V. Antipov, N. I. Rybakov et al *In its* Cosmic Res., Vol. 3, No. 3 18 Aug. 1965 p 246–251 refs (See N65-34925 23-30)

The results of a study of the biological effects of spaceflight factors aboard the Vostok 5 and Vostok 6 spacecraft are presented. It is established that the extent to which phage formation is induced in these experiments was almost the same as in the flights of Vostok 3 and Vostok 4, β-mercaptopropylamine is capable of blocking the formation of induced phage particles and lowering the level of the spontaneous lysogenic reaction under the conditions prevailing in spaceflight. Author

N65-35006# Association Claude Bernard, Paris (France).
RESEARCH RELATING TO THE STUDY OF RADIATION EFFECTS ON THE FUNCTIONS AND ENZYMATIC POTENTIAL OF PLATELETS [RECHERCHE SUR L'ETUDE DES EFFETS DES RADIATIONS SUR LES FONCTIONS ET L'EQUIPEMENT ENZYMATIQUE DES PLAQUETTES] Annual Report, 1963–1964
J. Caen Brussels, EURATOM, 1965 21 p refs In FRENCH; ENGLISH summary
(Contract EURATOM-019-63-3-BIOF)
(EUR-2438.f) CFSTI: HC $1.00/MF $0.50

After exposure of the platelet-rich citrated plasma to X-ray doses varying from 50 to 800 R, the following results were obtained: no change in the number of platelets; and a few morphological alterations in 2–10% of the cells, even after a 50 R dose. Author

N65-35016# Joint Publications Research Service, Washington, D. C.
THE BIOLOGICAL ACTION OF NEUTRON RADIATION
A. A. Gorodetskiy, ed. 2 Sep. 1965 135 p refs Transl. into ENGLISH of the book "Biol. Deystviye Neytronnogo Izlucheniya" Kiev, Naukova Dumka, 1965
(JPRS-31822, TT-65-32317) CFSTI: $4.00

A compilation of experimental material on the biological action of fast neutrons on animals and microorganisms is presented. The effects of neutron radiation on the cardiovascular and blood-producing systems, on certain physical-chemical properties of blood, and on the functional condition of the thyroid gland and the cortex of the suprarenal gland are examined. Problems concerning the techniques of irradiation and tissue dosimetry with a nuclear reactor are also discussed. Bibliographic information is included for each article. M.G.J.

N65-35017# Joint Publications Research Service, Washington, D. C.
BLOOD REGENERATION FOLLOWING LOSS OF BLOOD IN ANIMALS ACCLIMATIZED TO HIGH ALTITUDE
A. A. Almerekova 31 Aug. 1965 9 p Transl. into ENGLISH from Sov. Zdravookhr. Kirgizi' (Frunze), no. 2, Mar.–Apr. 1965 p 21–26
(JPRS-31781, TT-65-32276) CFSTI: $1.00

The effect of hypoxia on the organism was studied, and the importance of reduced partial pressure of oxygen on the formation of hemopoietins in acclimatized animals subject to hemorrhaging was examined. Investigations involved 14 dogs, acclimated to an altitude of 3200 meters for a month, and 8 unacclimated animals. The hemoglobin level, erythrocytes, reticulocytes, and hemopoietin content were determined, and controls were established to reveal characteristics of red blood regeneration after blood loss. The experiments are described, and data on the various tests are given. From these findings it was assumed that increased hemopoietic activity of blood serum, stimulating hemopoiesis, indirectly induces improvement in the course of oxidative processes; and that an increase in the hemopoietin level under high altitude conditions is a protective response of the organism against oxygen starvation. M.G.J.

N65-35020# California Univ., Livermore. Lawrence Radiation Lab.

NEUTRON ACTIVATION OF THE TERRESTRIAL ENVIRONMENT AS A RESULT OF UNDERGROUND NUCLEAR EXPLOSIONS

Yook C. Ng 22 Jun. 1965 42 p refs
(Contract W-7405-ENG-48)
(UCRL-14249) CFSTI: $2.00

The neutron activation products induced in the terrestrial environment following underground nuclear explosions are identified, and estimates for their production are presented. In the course of this effort all known stable nuclides were considered as parent materials for the more common neutron activation reactions—(n,γ), (n,2n) (n,p), and (n,α)—which result in the production of activities having a half-life of one day or greater. The induced radionuclides so identified are numerous and widely distributed in atomic number. Radionuclides of very short half-life were thought to lack the potential to contribute significantly to the internal dose and were not considered. Estimates for induced radionuclide production in granite are presented, and the activation products produced in substantial quantity are identified. Adequate estimates can be made for production in rocks differing in composition based on parent element concentrations and yields calculated for granite. When the fission-to-fusion ratio is 0.01, activation products from rock or soil will generally be comparable to fission products in activity if essentially all the fusion neutrons are released to the environment, and will be less prominent if the neutrons released are reduced through the use of nonactivating neutron absorbers. Author

N65-35035# Army Medical Research and Nutrition Lab., Denver, Colo.

THE TRACE MINERAL LOSSES IN SWEAT

C. Frank Consolazio, Richard A. Nelson, Le Roy O. Matoush, Ronald C. Hughes, and Paul Urone (Colorado Univ.) 18 Aug. 1964 17 p refs
(Rept.-284; AD-447382)

The results of this study show that considerable quantities of the trace minerals, including zinc, selenium, copper, cobalt, iodine, strontium, molybdenum, nickel, lead and chromium, are excreted in sweat, under conditions that produce profuse sweating. These losses are extremely important since they reflect losses that should be included in balance studies, which would greatly aid in evaluating more realistically the minimal daily requirements. As in previous studies, the excretion of these trace minerals in sweat decreases appreciably during acclimatization to hot environments. Author

N65-35036# School of Aerospace Medicine, Brooks AFB, Tex.

THE VALIDITY OF FLIGHT BLOOD PRESSURE DATA

James Roman, James P. Henry, and John P. Meehan (Southern Calif. Univ.) May 1965 18 p refs
(SAM-TR-65-27; AD-469295)

The validity of the acoustic method of blood pressure determination was checked on a pilot in the course of one mission in an NF-100-F jet fighter aircraft, by means of simultaneous arterial catheter data collection. Mean absolute error for both systolic and diastolic pressures was less than the mean respiratory variation in blood pressure for the 75 readings obtained. Author

N65-35045# Air Force Systems Command, Wright-Patterson AFB, Ohio. Biomedical Lab.

SKIN TEMPERATURE CHANGES CAUSED BY INTENSE DIFFUSE THERMAL RADIATION

W. C. Kaufman Apr. 1965 14 p refs Presented at the 21st Aerospace Med. Panel Meeting, Lisbon, 17–22 Sep. 1964
(AMRL-TR-65-64; AD-616698)

The rates at which critical levels of temperature are attained by the natural human skin exposed to intense thermal radiation have been studied using infrared quartz lamps. Early studies were done in a static aircraft in which a human subject in the cockpit was exposed to thermal radiation produced by 1,000 infrared lamps. Later, for more definitive studies, a radiometer and an infrared source, having irradiances that could be controlled between 0.06 and 0.7 cal/cm^2 sec, were constructed so that precise surface temperature measurements could be made during exposure to various intensities of thermal radiation. Spectra were varied by filtering through different substances. The whole dorsum of the hand was exposed and intradermal and subdermal temperatures were recorded from 0.13 mm thermocouples threaded through the skin. The rate of temperature rise is a function of the irradiance and the spectral characteristics of the source, the optical filter, and the skin. Plate glass, plexiglass, and a laminated glass aircraft windshield attenuated the temperature response by 0.3, 0.5, and 0.7 respectively in comparison with the unfiltered energy. These data have extensive civil defense, fire fighting, and military application. Author

N65-35060*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

FIXED-BASE-SIMULATOR STUDY OF ABILITY OF PILOTS TO PERFORM SOFT LUNAR LANDINGS BY USING A SIMPLIFIED GUIDANCE TECHNIQUE

G. Kimball Miller, Jr. and Herman S. Fletcher Washington, NASA, Oct. 1965 28 p refs
(NASA-TN-D-2993) CFSTI: HC $2.00/MF $0.50 CSCL 05H

A six-degree-of-freedom fixed-base-simulator study has been conducted of the ability of pilots to perform soft lunar landings by using a simplified guidance technique to deorbit from a synchronous transfer orbit and to place the landing vehicle in a position from which a vertical descent to touchdown in a specified area can be accomplished. The pilot had control of vehicle thrust along the longitudinal axis and of attitude through an acceleration command system. No automatic damping or control was assumed. The general piloting procedure consisted of maintaining a constant thrust angle with respect to the orbiting command module until nearly zero velocity was attained at an altitude of approximately 5000 ft. A vertical descent was then made to the lunar surface. Initially, a nominal trajectory was flown for which the deorbiting procedure was specified; subsequently, several off-nominal trajectories were flown. The results of the investigation indicated that the pilot's use of the simplified guidance technique with rather crude thrust-angle measurements resulted in placing the vehicle in a position from which soft landings in the desired lunar area could consistently be made. The characteristic velocity required for piloted landings was within about 10 percent of that required for a perfectly flown nominal trajectory. Author

N65-35104*# Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
AUDITORY FREQUENCY THRESHOLD COMPARISONS OF HUMANS AND PRE-ADOLESCENT CHIMPANZEES
Donald N. Farrer and Merle M. Prim Jun. 1965 15 p refs (NASA Order R-25)
(NASA-CR-67297; ARL-TR-65-6) CFSTI: HC $1.00/MF $0.50 CSCL 06C

Upper limits of hearing at 80 decibels (db) were established for five chimpanzees (age range: 4 to 6 years) and 90 humans (age range: 5 to 35 years). It was concluded that pre-adolescent chimpanzees have the ability to respond to higher frequencies than pre-adolescent children, and the diminution in human perception of high frequencies as a function of age was confirmed. Statistically significant decrements in hearing were found at 10-year intervals between 5 and 35 years of age. Trend analysis of these data suggested that the diminution in high frequency perception was linear and the variability appeared Gaussian. Author

N65-35105*# General Technical Services, Inc., Cleveland, Ohio.
[GENERAL DYNAMICS OF PHYSICAL-CHEMICAL SYSTEMS IN MAMMALS] Fourth Quarterly Progress Report, May 21–Aug. 20, 1965
A. S. Iberall 27 Aug. 1965 12 p refs
(Contract NASw-1066)
(NASA-CR-67225) CFSTI: HC $1.00/MF $0.50 CSCL 06P

Work continues on the mathematical modeling of the hydrodynamics of the arterial system, and attempts are underway to expose active normal tissue in guinea pigs so that microcirculation can be observed. Window techniques and fiber optics are being considered for the latter studies. Experiments also deal with blood constituent dynamics and temperature differences between arterial and venous flow. A paper is presented on the dynamics of metabolic control in mammalian microcirculation. M.W.R.

N65-35107*# AVCO Corp., Tulsa, Okla.
STUDY OF THE CORRELATION BETWEEN LINEAR ENERGY TRANSFER AND RELATIVE BIOLOGICAL EFFECTIVENESS First Quarterly Report, 1 Jul.–1 Oct. 1963
[1963] 31 p Prepared jointly with Okla. Univ. Res. Inst.
(Contract NASw-782)
(NASA-CR-67239) CFSTI: HC $2.00/MF $0.50 CSCL 06R

Procedures are described for an experiment to instrument the physical parameters, linear energy transfer (LET) and absorbed dose, and observe their lethal effect on yeast. The procedure is to establish a relative biological effectiveness of one for the yeast with 200 KVCP X-rays; quantitate the absorbed dose using a tissue equivalent ionization chamber; and, holding dose constant, vary and measure the LET by changing types of radiation and their incident energies. Thus, two contributing factors to cell death are measured and the amount of killing is observed through the decrease in the yeast's viability. The parameters, rad dose, LET, and cell viability, must be known to perform the experiment. To establish cell viability, yeast in a compacted mass are irradiated, the cell mass sectioned at various depths, and plate counts made of each section. To establish LET, an instrument measures energy transfer within the dimensions of a single cell to the surrounding medium by an ionizing particle. To establish dose, an instrument measures absorbed dose at a macroscopic point within a medium in units of ergs per gm. Experiment results with a compacted yeast cell mass indicate that with adequate control the technique is successful. R.N.A.

N65-35110*# Naval School of Aviation Medicine, Pensacola, Fla.
CHANGES IN SPONTANEOUS ACTIVITY AS A MEASURE OF SENSITIVITY TO ROTATION IN THE WHITE RAT
Arnold Eskin and David C. Riccio 11 Jan. 1965 14 p refs Joint report with NASA
(NASA Order R-93)
(NASA-CR-67253) CFSTI: HC $1.00/MF $0.50 CSCL 06S

Fifty-six unrestrained rats were individually exposed to a rotation speed between 0–18 rpm. Their activity was measured using a fourpoint scale: 0) no activity, 1) grooming and sniffing, 2) moderate running, and 3) rapid running. Amount of activity decreased as a function of rotation speed from 6 to 14 rpm, where it reached a lower limit plateau. Rate of decline within this speed range was also directly related to velocity. Postrotation activity was suppressed up to five minutes. The rats showed considerable sensitivity to Coriolis stimuli generated during constant speed of rotation. A relationship was found between duration and magnitude of stimulation. These findings are encouraging for the use of behavioral methods in studying sensitivity to motion. Author

N65-35116*# Public Health Service, Phoenix, Ariz. Technology Branch.
COMPARATIVE LEVELS AND SURVIVAL OF NATURALLY OCCURRING MICROORGANISMS DEPOSITED ON SURFACES THROUGH HANDLING AND AERIAL FALLOUT A Preliminary Report
Martin S. Favero, John R. Puleo, James H. Marshall, and Gordon S. Oxborrow 9 Aug. 1965 20 p refs *Its* Rept.-8 (NASA Order R-137)
(NASA-CR-67267) CFSTI: HC $1.00/MF $0.50 CSCL 06F

Studies were performed to determine the death rates of naturally occurring microorganisms deposited on surfaces of stainless steel and electronic components by handling and aerial fallout. Experiments were carried out in both spacecraft assembly areas in operation and in laboratory environments. Stainless steel strips were exposed to industrial clean room and laboratory environments for a period of time and then covered with sterile aluminum foil. Assays were performed immediately before and at intervals up to 8 weeks after covering. The results indicated clearly that the total aerobic mesophilic population decreased by approximately 50 percent after 2 weeks. Non-spore-forming bacteria were reduced by 80 percent after 2 weeks. The aerobic sporeformers, molds, and actinomycetes did not appear to be affected. In another series of tests sterile stainless steel strips were contaminated by handling, placed in sterile containers and assayed at intervals up to 4 weeks. After 2 weeks, less than 10 percent of the microbial population survived and after 4 weeks, 1 to 2 percent survived. Author

N65-35150# Joint Publications Research Service, Washington, D. C.
TRANSLATIONS FROM BIOFIZIKA, (BIOPHYSICS), VOLUME X, NO. 4, 1965
30 Sep. 1965 24 p refs Transl. into ENGLISH from Biofizika (Moscow), v. 10, no. 4, 1965 p 619–624, 641–644, 699–700, 704–707
(JPRS-32209; TT-65-32699)

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3. PARTICIPATION OF PHOSPHOPROTEINS IN ACTIVE ION TRANSPORT IN RAT-CORTEX SECTIONS B. A. Tashmukhamedov and N. P. Lisovskaya p 13–16 refs (See N65-35153 23-04)

4. BIOELECTRIC PHENOMENA IN SINGLE-CELLED ORGANISMS N. N. Kokina p 17–21 refs (See N65-35154 23-04)

N65-35151# Joint Publications Research Service, Washington, D. C.

RELATIONSHIP OF THE PROBLEM OF MITOGENETIC RADIATION TO CURRENT TRENDS IN BIOPHYSICAL RESEARCH

A. A. Gurvich *In its* Transl. from Biofiz., (Biophys.), Vol. X, No. 4, 1965 30 Sep. 1965 p 1–7 refs (See N65-35150 23-04)

A general discussion of data and theories pertaining to mitogenetic radiation and of data gathered and analyzed in contemporary biophysical research is presented. The article points out the common interpretation of individual phenomena (the free radical mechanism of chemiluminescence) and the similarity between certain general hypotheses regarding the molecular substrate of living systems and the corresponding concepts and constructs developed by A. G. Gurvich. R.N.A.

N65-35152 Joint Publications Research Service, Washington, D. C.

SUBSTRUCTURAL ORGANIZATION OF THE GRAVITATION ORGAN OF THE PIGEON UTRICLE

Ya. A. Yinnikov, V. I. Govardovskiy, and I. V. Osipova *In its* Transl. from Biofiz., (Biophys.), Vol. X, No. 4, 1965 30 Sep. 1965 p 8–12 refs (See N65-35150 23-04)

The results of an electron microscopic study of the pigeon utricle are presented. It was found that the avian utricle contains both cylindrical ciliated cells of the second type and urceiform cells of the first type. Cells of the first type are consistent in structure and are equipped with stationary stereoliths, whose distal ends bear the otolithic membrane and otoliths, and a single polar mobile kinocilium. The innervation of these cells differs greatly. Ciliated cells of the second type are in contact with small dark and light nerve endings. Cells of the first type are in contact with cyathiform nerve endings over their entire plasma membrane, except for the apex. Two to five cells are usually enclosed in a single giant neural cup. The appearance of such giant cyathiform synapses, which innervate several ciliated cells simultaneously, is probably a new evolutionary adaptation in birds and is associated with their ability to move freely in the air. R.N.A.

N65-35153 Joint Publications Research Service, Washington, D. C.

PARTICIPATION OF PHOSPHOPROTEINS IN ACTIVE ION TRANSPORT IN RAT-CORTEX SECTIONS

B. A. Tashmukhamedov and N. P. Lisovskaya *In its* Transl. from Biofiz., (Biophys.), Vol. X, No. 4, 1965 30 Sep. 1965 p 13–16 refs (See N65-35150 23-04)

A study was conducted on the renewal rate of phosphoprotein (PP) phosphorus in rat cortex sections with the ion pump functioning under various conditions. Varying pump function activation or attenuation was achieved by altering section incubation conditions, by replacing the Na^+ in the incubation medium with Li^+ or chlorine, and by exposure to cardiac glucosides. Experimental results show that there is a correlation between the rate of PP metabolism and the activity of ion transport in intact cortical cells. A PP fraction metabolized at a definite rate apparently participates in active ion transport as a protein ion carrier. This conclusion is in agreement with hypotheses previously advanced. R.N.A.

N65-35154 Joint Publications Research Service, Washington, D. C.

BIOELECTRIC PHENOMENA IN SINGLE-CELLED ORGANISMS

N. N. Kokina *In its* Transl. from Biofiz., (Biophys.), Vol. X, No. 4, 1965 30 Sep. 1965 p 17–21 refs (See N65-35150 23-04)

Three different types of electrical response reactions to stimulation were observed in *Opalina ranarum*. The most frequently encountered response was a change in periodic activity, either inhibited or stimulated. The second type of reaction consists of depolarization and subsequent slow restoration of potential. The third reaction consists of a burst of fast low voltage impulses. These reactions were compared with response reactions of other single cell organisms, myxomycetes, and plants. From this comparison it was hypothesized that the electrical reactions to stimulation of these organisms have certain common characteristics: the dependence of potential shape and amplitude on stimulus strength, the slow development of potentials with time, and the appearance under certain conditions of faster potentials exhibiting no marked dependence on stimulus strength, but differing greatly from the typical neuromuscular spike. Excitable structures at this stage of development exhibit slow progressive reactions of the receptor membrane and a capacity for fast electrical reactions. Subsequent development gives the latter the form of the fast action currents of nerve and muscle cells. R.N.A.

N65-35197# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

COMPUTER SIMULATION OF VISUAL DATA PROCESSING IN THE HUMAN BRAIN

Donald La Marr Ockerman (M.S. Thesis) Jun. 1965 121 p refs (GGC/EE/65-10; AD-619394)

The operation of the visual portion of the human brain has been simulated on the IBM-1620 and IBM-7094 digital computers. The simulation is designed using the cross-correlation method postulated by Dr. Kabrisky. The simulation is very coarse as the grain size of the visual area of the human brain is four hundred times finer than the computer model. The model stores new patterns, standardizes pattern sizes, rotates the input pattern and recognizes identical or similar patterns. The model is evaluated by inserting twenty test patterns. The model did seem to simulate the human visual recognition system for these input patterns. The model will recognize patterns that are reduced, enlarged, shifted, or rotated. After analyzing the satisfactory results recommendations are made for the design of larger and more intricate models. The computer programs and sample results are included. Author

N65-35199# Naval School of Aviation Medicine, Pensacola, Fla.

PERFORMANCE IN THE PRE-FLIGHT WATER SURVIVAL COURSE AS A PREDICTOR OF SUCCESS IN FLIGHT TRAINING

Charles W. Hutchins, Jr. and Richard S. Pomarolli Jun. 1965 11 p ref *Its* Spec. Rept.-65-3 (AD-619302)

The water survival course grades of 1300 Pre-Flight students were analyzed to determine the utility of these grades as predictors of eventual completion or failure in the flight training program. The Wherry-Doolittle method of test selection was used to evaluate two performance measures from the course: Mid-Course grade and the Swim-Hold status. Results indicate that both these measures make small but statistically significant contributions to the validity of the multiple predictor. There is evidence that the value of the water survival course as a predictor derives more from a student's initial ability as a swimmer than from his progress in the course. Author

N65-35219*# Massachusettss Inst. of Tech., Cambridge. Center for Communication Sciences.
A MODEL OF THE PERIPHERAL AUDITORY SYSTEM—A CASE STUDY IN NEURAL MODELING
Thomas F. Weiss [1964] 10 p Presented at the Intern. Bio- (Grants NsG-496; NSF GP-2495; NIH-NH-04737-04; Contract DA-36-039-AMC-03200(E))
(NASA-CR-58094) CFSTI: HC $1.00/MF $0.50 CSCL 05H

A method to formalize and test a mechanistic model of the peripheral auditory system is discussed. The spontaneous activity, response to acoustic clicks, tones and tone bursts were studied for a class of mechanistic models that consist of a linear mechanical system, a nonlinear, memoryless transducer and a model neuron. Results generated by this model fit the VIIIth cranial nerve data quantitatively along some dimensions and only in a very qualitative sense along other dimensions. R.W.H.

N65-35262*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
HYPOXEMIA INDUCED BY SUSTAINED FORWARD ACCELERATION IN PILOTS BREATHING PURE OXYGEN IN A FIVE POUNDS PER SQUARE INCH ABSOLUTE ENVIRONMENT
W. C. Alexander, R. J. Sever, and F. G. Hoppin (Naval Air Develop. Center) [1964] 25 p refs Presented at the Aerospace Medical Assoc., Miami, Fla., 11 May 1964
(NASA-TM-X-51649) CFSTI: HC $1.00/MF $0.50 CSCL 06S

An investigation was undertaken to study the patterns and severity of hypoxia induced by prolonged forward acceleration while breathing pure oxygen at a pressure of one-third atmosphere under conditions that simulate the dynamic and environmental aspects of manned earth entry missions. Cabin environments of one atmosphere and one-third atmospheres, with air and 100% oxygen, respectively, breathed on demand by the pilot were employed in the study. Data collected for thirty-five professional military pilots demonstrate a resultant diminishing arterial oxygen saturation as a function of magnitude and duration of acceleration and the environment of the pilot. R.N.A.

N65-35295# Naval Medical Research Lab., New London, Conn.
AUTONOMIC RESILIENCY, SUBJECTIVE SYMPTOMATOLOGY, AND SUBMARINE STRESS
Benjamin B. Weybrew 12 Nov. 1963 20 p refs
(MR-63-13; AD-465219)

Four difficulties encountered in research on biological stress are discussed and the major factors which may account for individual differences in stress adjustments are indicated. Also, the factors acting as stressors in the submarine environment are identified and the response pattern to these stress factors is delineated. The autonomic nervous system mechanisms concerned are described and stress methodology is presented. This investigation should provide better understanding of the stress factors inherent in prolonged submergence in a submarine and clues as to prophylactic measures which may prevent debilitative or pathological responses to prolonged stress. E.E.B.

N65-35296# Electro-Voice, Inc., Buchanan, Mich. Engineering Dept.
[AN EVALUATION OF THE EXPERIMENTAL HEADSET IN A HIGH INTENSITY NOISE FIELD] Status Report, 15 Feb. 1965–15 Mar. 1965
Robert C. Ramsey [1965] 4 p
(Contract AF 33(615)-1295)
(AD-463731)

An evaluation of an experimental headset in a high intensity noise field is briefly described. Listening and speaking tests were performed with the overall noise level adjusted to 114, 120, 126, and 129 db re .0002 dynes/cm^2 and with a spectrum shaped to the Gemini specification. Using the same high intensity noise facility a comparison between an experimental microphone and the M-93 microphone was performed. Results indicate that the loudness of the background noise was lower on the M-93 microphone for all test conditions; the difference in performance between the two microphones was least for the 1/2 inch position; and at high sound pressure levels the movement of the mouth near the M-93 caused an output signal such that an acoustic image effect was noted. G.A.L.

N65-35317*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ELECTRON MICROSCOPY OF RAT CEREBELLAR CORTEX FOLLOWING EXPOSURE TO IONIZING RADIATION
Rosita F. de Estable, Juan F. Estable-Puig, and Webb Haymaker [1964] 26 p refs
(NASA-TM-X-51592) CFSTI: HC $2.00/MF $0.50 CSCL 06R

The purpose of this paper is to describe the ultrastructural changes found in the irradiated cerebellar cortex of the rat following fixation by osmium perfusion. The cerebellum was selected for study because it contains a wide variety of easily recognized cellular types and structures in a small volume of tissue. Author

N65-35343# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio. Behavioral Sciences Lab.
ENGINEERING PSYCHOLOGY, TRAINING PSYCHOLOGY, ENVIRONMENTAL STRESS, SIMULATION TECHNIQUES, AND PHYSICAL ANTHROPOLOGY 1964 Supplement to a Bibliography of Reports Issued by the Behavioral Sciences Lab.
Lavon E. Trygg, comp. 1 Jan. 1965 14 p refs
(AD-464531)

A bibliography is presented on *Systems Development; Physical Anthropology; Apparatus; Control Design and Arrangement; Environmental Stress; Human Engineering; Maintenance; Methodology and Statistics; Personnel and Manning Requirements; Presentation of Information; Simulation; Tracking and Servo Analysis; Training and Learning;* and *Zero-G Studies.* E.E.B.

N65-35409*# SPACO, Inc., Huntsville, Ala. Human Factors Lab.
ON CERTAIN AREAS OF HUMAN FACTORS A Literature Search
Charles Edward White Aug. 1964 46 p refs
(Contract NAS8-11675)
(NASA-CR-67336) CFSTI: HC $2.00/MF $0.50 CSCL 05E

An annotated bibliography is presented on human factors and includes references on man's basic characteristics, man's characteristics at an interface, man's characteristics in a group, optimization of machine characteristics to match man's characteristics, optimization of environment to match man, extracted output from man, unusual input to man, handbooks on human factors and engineering, and bibliographies. The appendices contain abstracts of works on the brain machinery, biotechnology, and color vision theory. R.N.A.

N65-35430# Human Sciences Research, Inc., McLean, Va.
RESEARCH ON VISUAL TARGET DETECTION. PART 1: DEVELOPMENT OF AN AIR-TO-GROUND DETECTION/IDENTIFICATION MODEL

Margaret E. Franklin and John A. Whittenburg Jun. 1965 166 p refs
(Contract DA-31-124-ARO(D)-287)
(HSR-RR-65/4-Dt; AD-619275)

The objective was to develop a simple, operational model for predicting air-to-ground visual detection/identification of tactical targets. The model, based on data from the literature, was limited to conditions of daylight and clear visibility. A preliminary model was developed using data from a field study of air-to-ground detection-identification of tactical targets. Variables to be included in the model were selected from a list of variables found to be important in previous studies. The model includes estimates of eight input variables—target size, target shape, target/ground contrast, clutter, terrain type, aircraft altitude, aircraft speed, and range—which were grouped into three composite variables (target apparent size, target distinctiveness, and effective exposure time). A numerical summary of relevant studies on target detection/identification and a description of model calculations are presented as appendices. Author

N65-35517*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
REMOTE PILOT-CONTROLLED DOCKING WITH TELEVISION
Edward R. Long, Jr., Jack E. Pennington, and Perry L. Deal Washington, NASA, Oct. 1965 35 p refs
(NASA-TN-D-3044) CFSTI: HC $2.00/MF $0.50 CSCL 05H

An investigation of the use of closed circuit television (CCTV) as an instrument for pilot-controlled visual docking of two space vehicles was conducted on the rendezvous docking simulator (RDS). The RDS is a full-scale dynamic facility which is used to study pilot-controlled docking of various types of space vehicles. The vehicles simulated in this study were the Gemini spacecraft and the Agena booster. The first part of this two-part study was designed to compare the pilot's ability to remotely control a docking by using only information obtained from a television monitor with his ability to control the docking by direct vision from within the spacecraft. In the second part of the study the camera was mounted in the Gemini nose with the lens center line along the longitudinal axis of the vehicle, so that the camera saw no part of the Gemini vehicle. Author

N65-35520*# National Aeronautics and Space Administration, Washington, D. C.
BALLISTOCARDIOGRAPHY, A BIBLIOGRAPHY [1877–1964]
Sep. 1965 49 p Prepared jointly with FAA
(NASA-SP-7021; FAA-AM-65-15) GPO: $0.35/CFSTI: MF $0.50 CSCL 06E

N65-35524*# National Aeronautics and Space Administration, Washington, D. C.
THE PROBLEM OF ESTABLISHING TOLERABLE DOSES OF IONIZING RADIATION FOR CREW MEMBERS OF SPACECRAFTS
Yu. G. Grigor'yev, A. K. Gus'kova, M. P. Domshlak, V. G. Vysotskiy, S. A. Rayevskaya et al Oct. 1965 25 p refs Transl. into ENGLISH of the paper "Problema Obosnovaniya Dopustimykh Doz Ioniziruyushchey Radiatsii Dlya Chlenov Ekipazha Kosmicheskikh Korabley" USSR, Min. of Health Presented at 16th Intern. Astronautical Congr., Athens, 13–18 Sep. 1965
(NASA-TT-F-9589) CFSTI: HC $1.00/MF $0.50 CSCL 06R

A classification of irradiation levels was devised that can be used to evaluate cosmic radiation danger to spaceship crews during space flights. The categories set up and discussed are 1) the tolerable dose (TD), 2) the dosage of justifiable risk (JRD), and 3) the critical dose. Hospital patients who had been subjected to irradiation for treatment of cancer were studied for total body condition, and dynamics of peripheral blood changes. Varying degrees of reaction were studied, and a table giving the observational results in degrees of severity of primary reaction symptoms depending on radiation dosage is presented. The data indicate that most of the individuals tolerated 25 and 50 r radiation doses well. With increasing dosage the total number of individuals without primary reaction to irradiation was observed to decrease. With a 125 r dose, only 35.8% of the examinees were without clinical symptoms of total reaction. It was determined that the critical radiation dose during short space flights is 125 r. A tentative estimate of 100 rem/year is made for long flights. L.S.

N65-35526# California Univ., Livermore. Lawrence Radiation Lab.
PALMITYL-COENZYME A INHIBITION OF THE CITRATE-CONDENSING ENZYME
Paul A. Srere 22 May 1964 14 p refs
(Contract W-7405-ENG-48)
(UCRL-7896)

The citrate-condensing enzyme can be partially protected from palmityl-CoA inhibition by oxaloacetate. The interaction between the enzyme and palmityl-CoA led to the firm binding of 16 moles of the compound per mole of enzyme for a 27% inhibited enzyme. With a 70% inhibited enzyme little change was seen in the sedimentation behavior. It is concluded that the interaction is not physiologically significant. Author

N65-35542# Grumman Aircraft Engineering Corp., Bethpage, N. Y. Research Dept.
KINETIC CUEING IN SIMULATED CARRIER APPROACHES. SUPPLEMENT I: STUDY DETAILS
Joseph N. Ruocco, Patrick A. Vitale, and Robert C. Benfari Port Washington, N. Y., U. S. Naval Training Device Center, 28 Apr. 1965 225 p
(Contract N61339-1432)
(NAVTRADEVCEN-1432-1-S1; AD-618756)

Pairs of matched pilots were trained using a flight simulator in a carrier-landing maneuver under two conditions, kinetic and static. This is a supplement for the technical reader providing detailed information on the equipment used, on the experimental design, and on the reduction of data. Author

N65-35574# Bureau of Social Science Research, Inc., Washington, D. C.
FEAR AND ENTHUSIASM IN SPORT PARACHUTING
Samuel Z. Klausner May 1965 34 p Submitted for Publication
(Contract AF 49(638)-992)
(AFOSR-65-1329; AD-619389)

Replies to a mail questionnaire by 825 sport parachutists affiliated with 103 parachute clubs are the data of this study. Questionnaires, administered by officials of the individual clubs, asked about the experience of fear and enthusiasm, personal and social characteristics of the parachutists, attitudes relevant to sport parachuting, and included the Ma and Hy scales from the MMPI, a draw-a-person test, and four story-stimulus pictures of parachuting situations. Only the jump experience, an analysis of the stories told about one picture, and a few social characteristics are reported. TAB

N65-35577*# RAND Corp., Santa Monica, Calif.
THE MONITORING TASK IN AUTOMATED CHECKOUT OF SPACE VEHICLES

L. Chesler and R. Turn Sep. 1965 52 p refs
(Contract NASr-21(08))
(NASA-CR-67371; RM-4678-NASA) CFSTI: HC $3.00/MF $0.50 CSCL 05H

The roles that a human monitor may need to assume in automated checkout operations are presented, the information requirements for performance of selected monitoring tasks is described, and a set of computer-driven information displays for increasing human effectiveness is proposed. Also, questions concerning implementation of the proposed displays are considered. It is suggested that providing the human monitor with means to regulate the rate of performance of automated testing may greatly increase the ability of humans to perform tasks. An outline for a network display program is included. E.E.B.

N65-35580*# Stanford Research Inst., Menlo Park, Calif.
STUDIES ON THE HILL REACTION ACTIVITY OF SOLUBLE CHLOROPLAST EXTRACTS Final Report
Lloyd K. Moss and Janice E. Coomber 25 Aug. 1965 52 p refs
(Contract NASr 49-11; SRI Proj. BU-4435)
(NASA-CR-67374) CFSTI: HC $3.00/MF $0.50 CSCL 06C

Carrier-free continuous electrophoresis was applied to chloroplast fragments from common spinach, *Spinacia oleracea*, and the electrophoretic fractions tested as biochemical catalysts in the Hill reaction. Specific Hill reaction activity was successfully demonstrated after excursion through a commercial preparative electrophoresis instrument. Activity was greater for electrophoretic effluents than for unfractionated material. Maximum activity in the effluents did not correspond to the maximum chlorophyll concentrations, indicating either inhibition by certain components or some optimum proportion of catalytic cofactors. Differences in absorption spectra of fractions occurred in the ultraviolet region but were not significant in the visible region. Novel methods to preserve the biological integrity of components were also studied. Although digitonin facilitated the solubilization of the pigment-protein complex, some Hill reaction activity was lost. DMSO (dimethyl sulfoxide) was a useful solubilizing agent with no detrimental effect on Hill activity. Preservation of activity was obtained by adding colloids, as normal and immune rabbit serum, gelatin, and dextran, to the solvent for chloroplast preparation. Further studies of proteins in fractions separated electrophoretically or by chromatography on Sephadex or modified cellulose ion exchangers are recommended. S.C.W.

N65-35587# Graflex, Inc., Rochester, N. Y.
FILMSTRIP TECHNIQUES FOR INDIVIDUALIZED INSTRUCTION
William H. Trow and Edgar A. Smith (AMRL) Wright-Patterson AFB, Ohio, AMRL, May 1965 19 p refs
(Contract AF 33(657)-11339)
(AMRL-TR-65-78; AD-617609)

Factors affecting the selection of a film format as the visual medium in programmed instruction are discussed. Focused on are: revision, quantity, length, storage, recycling, the aspect ratio, change time, random access, and continuous repetition. Comparative cost data on the preparation of a master of the filmed program and duplicate copies are included; and problems associated with the preparation of filmstrips by staff photographers, such as single-frame cameras, the preparation of flat copy, exposure, and splicing, are discussed. Also described are several film formats applicable to audio-visual programming. S.C.W.

N65-35630# Kent State Univ., Ohio.
SOME HISTOCHEMICAL RESPONSES OF GUINEA PIG TISSUES TO COLD
Charles G. Wilber Ft. Wainwright, Alaska, Arctic Aeromed. Lab., Feb. 1965 16 p refs
(Contract AF 41(609)-1973)
(AAL-TDR-64-9; AD-615011)

Guinea pigs weighing approximately 300 gm were kept in a cold room, held at 6° C, for two weeks. Various organs were then studied histochemically. Liver glycogen is rapidly used up in cold-exposed guinea pigs. The fate of liver lipids is unknown. Lipids in the cortex of the adrenals appear to decrease, and chromaffin material in the medullary areas of the adrenals disappears. There is cavitation in the cortex and an erosion of medullary areas. There is increased metachromasia in the lower tubular areas of the kidneys, but the functional significance of this is not clear. Author

N65-35632# Air Force Systems Command, Wright-Patterson AFB, Ohio. Behavioral Sciences Lab.
TRAJECTORY VERSUS LINE-OF-SIGHT SPACE RENDEZVOUS USING OUT-OF-WINDOW VISUAL CUES Technical Report, Jun.–Sep. 1964
Herbert J. Clark Feb. 1965 64 p refs
(AMRL-TR-65-10; AD-615157)

Seven trained subjects flew simulated short range coplanar orbital rendezvous maneuvers, using direct visual cues only. Two rendezvous techniques were compared: line-of-sight and trajectory. In the former, the subject could control up-down and fore-aft thrust only; in the latter, he could, in addition, control pitch. Using either technique, all subjects were able to maneuver successfully to a position 100 ft directly in front of the target at a terminal velocity of less than 5 ft/sec. Significantly, less fuel was expended in performing the trajectory maneuver. The principal man-machine performance factors in the line-of-sight maneuver were tentatively described as (1) the ability to conserve fuel used for longitudinal and vertical translation, (2) the ability to conserve mission time, and (3) the ability to proficiently close with the target. Author

N65-35763# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio. Biophysics Lab.
A SUMMARY OF HUMAN TOLERANCE TO PROLONGED ACCELERATION Technical Report, Jan. 1963–Jan. 1965
Alvin S. Hyde and Harold W. Raab Feb. 1965 42 p refs
(AMRL-TR-65-36; AD-615570)

Human subject tolerance to accelerations of greater than one second duration is summarized for the X, Y, and Z axes. Because each investigator at each laboratory utilizes different restraint systems, body positions, ambient temperatures, etc, and most important, utilizes different criteria of "tolerance," the data are referenced and presented in tables and graphs for each major category (direction) of acceleration. The points presented in the graphs and tables are usually the highest values achieved; in each series there were subjects who could not tolerate the given direction, amplitude, and duration. Author

N65-35780*# National Aeronautics and Space Administration, Washington, D. C.
THE DRINKING STIMULUS AND RATE OF WATER PASSAGE FROM THE STOMACH TO THE INTESTINE [PITʹYEVOYE VOZBUZHDENIYE I SKOROSTʹ PEREKHODA VODY IS ZHELUDKA V KISHECHNIK]
V. G. Kassilʹ Jun. 1965 9 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 159, no. 5, 1964 p 1194–1196
(NASA-TT-F-9391) CFSTI: HC $1.00/MF $0.50 CSCL 06P

Evidence is presented in support of a gastric emptying mechanism whereby regulation of the fluid flow from the stomach into the duodenal is realized by virtue of centralized

nervous activities, tentative forms of which might be internal temperature, hormonal activity, or variations in the stimulus level of the drinking center. A further indication is that the stomach acts as a reservoir, metering fluids into the organism's interior medium depending on current need. The dependence of gastric emptying on thirst is determined, using "imaginary drinking" experiments and isolating the resultant effects from stimulation of the mucilagenous portion of the duodenum.

N65-35782*# National Aeronautics and Space Administration, Washington, D. C.
A DEVICE FOR RECORDING PRESSURE, PULSE VOLUME, AND MECHANOGRAM ON THE MPO-2 OSCILLOGRAPH [PRISTAVKA DLYA ZAPISI DAVLENIYA, OB'YEMNOGO PUL'SA I MEKHANOGRAMM NA OSTSILLOGRAFE MPO-2]
N. N. Vasilevskiy and O. Ye. Guzeyev Sep. 1965 8 p ref Transl. into ENGLISH from Fiziol. Zh. SSSR (Moscow), v. 49, no. 7, 1963 p 886-888
(NASA-TT-F-9581) CFSTI: HC $1.00/MF $0.50 CSCL 06L
The authors describe the construction of a pneumovibrator to be used in recording pulse volume and blood pressure, in plethysmography, and in mechanograms. It is recommended for extensive use under experimental and clinical conditions. Author

N65-35783*# National Aeronautics and Space Administration, Washington, D. C.
THE PROBLEM OF COLLECTING DIAGNOSTIC INFORMATION UNDER SPACE-FLIGHT CONDITIONS AS ONE OF THE TRENDS IN MEDICAL CYBERNETICS [PROBLEMA SBORA DIAGNOSTICHESKOV INFORMATSII V USLOVIYAKH KOSMICHESKOGO POLETA KAK ODNO IZ NAPRAVLENIY MEDITSIVSKOY KIBERNETIKI]
V. V. Parin and R. M. Bayevskiy Oct. 1965 21 p refs Transl. into ENGLISH of a paper presented at the 16th Intern. Astronautical Congr., Athens, 13-18 Sep. 1965
(NASA-TT-F-9588) CFSTI: HC $1.00/MF $0.50 CSCL 06B
The function of the medical data collecting systems on board spacecrafts is reviewed. Future long duration flights will require the use of on-board computers and powerful diagnostic algorithms. Author

N65-35784*# National Aeronautics and Space Administration, Washington, D. C.
THEORETICAL PROBLEMS OF CONSTRUCTING ARTIFICIAL ECOLOGICAL SYSTEMS [NEKOTORYYE TEORETICHESKIYE VOPROSY POSTROYENIYA ISKUSSTVENNYKH EKOLOGICHESKIKH SISTEM]
A. B. Rubin and A. S. Fokht Oct. 1965 12 p refs Transl. into ENGLISH of a paper presented at the 16th Intern. Astronautical Congr., Athens, 13-18 Sep. 1965
(NASA-TT-F-9590) CFSTI: HC $1.00/MF $0.50 CSCL 06K
The creation of closed ecological systems for supporting life during prolonged space flights is discussed. The main approaches toward studying energy efficiency and operational stability of such a system are examined. Author

N65-35785*# National Aeronautics and Space Administration, Washington, D. C.
RESULTS OF CERTAIN ELECTRO-PHYSIOLOGICAL INVESTIGATIONS ON THE "VOSKHOD" SPACECRAFT [REZUL'TATY NEKOTORYKH ELEKTROFIZIOLOGICHESKIKH ISSLEDOVANIY NA KORABLE 'VOSKHOD']
I. T. Akulinichev, V. V. Bogdanov, D. G. Maksimov, and I. I. Popov Oct. 1965 13 p refs Transl. into ENGLISH of a paper presented at the 16th Intern. Astronautical Congr., Athens, 13-18 Sep. 1965
(NASA-TT-F-9591) CFSTI: HC $1.00/MF $0.50 CSCL 06S
The crew of the Voskhod spacecraft included a doctor who performed operative medical control and studied the condition of the crew members. The apparatus used for this purpose is described. Author

N65-35786*# National Aeronautics and Space Administration, Washington, D. C.
CERTAIN RESULTS OF PHYSIOLOGICAL AND ECOLOGICAL INVESTIGATIONS OF THE CHLORELLA CULTURE AS A LINK IN A CLOSED ECOLOGICAL SYSTEM [NEKOTORYYE ITOGI FIZIOLOGO-EKOLOGICHESKOGO ISSLEDOVANIYA KUL'TURY KHLORELLY KAK ZVENA ZAKRYTOY EKOLOGICHESKOY SISTEMY]
Ye. Ya. Shepelev Oct. 1965 15 p refs Transl. into ENGLISH of a paper presented at the 16th Intern. Astronautical Congr., Athens, 13-18 Sep. 1965
(NASA-TT-F-9592) CFSTI: HC $1.00/MF $0.50 CSCL 06K
Unicellular algae including chlorella, represent one of the leading components of biological life-support systems on spacecrafts. The material balance of that portion of the photosynthesis link based on utilizing unicellular algae is discussed. Author

N65-35828*# National Aeronautics and Space Administration, Washington, D. C.
AN ORIGINAL PROBLEM IN AEROSPACE BIOLOGY: THE EFFECT OF MECHANICAL VIBRATIONS AT THE CELLULAR LEVEL [UN PROBLEME ORIGINAL EN BIOLOGIE AEROSPATIALE: L'ACTION DES VIBRATIONS MECANIQUES AU NIVEAU CELLULAIRE]
P. Grognot, R. Loubiere, and A. Pfister Oct. 1965 7 p Transl. into ENGLISH of a paper presented at the 2d Intern. Symp. on Basic Environ. Probl. of Man in Space, Paris, 14-18 Jun. 1965
(NASA-TT-F-350) CFSTI: HC $1.00/MF $0.50 CSCL 06S
In mice vibrated for 7, 15, or 30 minutes, the authors find an anaphase change of about 40%. The sensitivity of mitosis to mechanical vibrations is confirmed. Author

N65-35890# Joint Publications Research Service, Washington, D. C.
STUDIES ON THE EFFECTS OF ANTI-RADIATION DRUGS
9 Sep. 1965 15 p refs Transl. into ENGLISH of 2 articles from Farmakol. i Toksikol., (Moscow), v. 28, no. 3, May-Jun. 1965 p 347-349, 351-355
(JPRS-31933; TT-65-32427) CFSTI: $1.00

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N65-35891 Joint Publications Research Service, Washington, D. C.
PERFORMANCE CAPACITY OF ANIMALS FOLLOWING THEIR IRRADIATION, ADRENALECTOMY AND THE ADMINISTRATION OF ANTIRADIATION DRUGS
A. M. Stashkov *In its* Studies on the Effects of Anti-Radiation Drugs 9 Sep. 1965 p 1–5 refs (See N65-35890 24-04) CFSTI: $1.00

Physical endurance in white mice and in rats following adrenalectomy, administration of antiradiation drugs, and irradiation, was studied. Their performance capacity was directly contingent on the level of oxidizing processes. Adrenalectomized mice and rats showed a 20 to 25 percent greater depression of the physical endurance rate under the action of X-radiation as well as longer duration of barbamyl-induced narcotic sleep, than intact animals. The initial phase of the cystamine-induced depression of physical endurance was approximately 50 percent greater in adrenalectomized rats than in intact animals. G.G.

N65-35892 Joint Publications Research Service, Washington, D. C.
EFFECT OF ANTI-RADIATION DRUGS ON THE MUSCULAR ACTIVITY OF THE SMALL INTESTINE
L. F. Semenov, R. B. Strelkov, and V. I. Reshetnyak-Moiseyeva *In its* Studies on the Effects of Anti-Radiation Drugs 9 Sep. 1965 p 6–12 refs (See N65-35890 24-04) CFSTI: $1.00

The following anti-radiation drugs were studied for their effects on the muscular activities of isolated segments of the small intestines from guinea pigs: Cystamine, β-mercaptoethylamine, S-(2-aminoethyl) isothiuronium bromide hydrobromide, thiourea; unithiole, maxamine (5-methoxytriptamine), and serotonin. Contractions of the isolated intestinal segment were recorded and compared with control experiments using histamine and acetylcholine. It was found that all sulfur-containing preparations in radioprotective doses caused contractions of the isolated intestinal segment. Serotonin and mexamine caused specific contractions of the isolated intestinal segment that were attenuated by dimedrol, aminazine, to a lesser degree by atropine, and hardly at all by redergam. G.G.

N65-35916# Library of Congress, Washington, D. C. Aerospace Technology Div.
SOME EXPERIMENTAL OBSERVATIONS OF THE EFFECT OF A HIGH-FREQUENCY ELECTROMAGNETIC FIELD *IN VIVO* AND *IN VITRO* [NEKTERA EXPERIMENTALNI POZOROVANI UCINKU VYSOLOFREKVENCNIHO ELEKTROMAGNETICKEHO POLE *IN VIVO* A *IN VITRO*] Translations of Soviet-Bloc Scientific and Technical Literature
K. Marha 26 Jul. 1965 12 p Transl. into ENGLISH from Pracovni Lekar. (Prague), v. XV, no. 6, 1963 p 238–242 (ATD-T-65-56; AD-618466)

Experimental results obtained through application of centimeter waves to rabbits, young male rats, as well as to *in vivo* experiments on water, saturated solutions of CO_2, and on human serum albumin, are presented. It was found that the biological effects of centimeter waves in acute applications are to a certain extent reversible. The breakdown of the organisms occurred only at a certain dose. Repeated irradiations, and also pulsed operation of the wave signal, increased the biological effectiveness; the degree of effectiveness depended primarily on the instantaneous amplitude and secondarily on the mean field flux density. It was concluded that the harmful effects of a high-frequency field on the organism constitute overheating as well as a nonthermal effect, particularly at low densities. G.G.

N65-35942# Virginia Univ., Charlottesville. Biochemical Lab.
ERYTHROCYTE BIOCHEMISTRY
Alfred Chanutin [1965] 162 p refs
(Grant DA-MD-49-193-64-G133)
(AD-617518)

Among the data presented concerning the biochemistry of erythrocytes are: erythrocyte enzymes, in vivo aging, infant erythrocytes, glutathione, erythrocyte lipids, nucleotide metabolism, phosphate exchange, sodium and potassium transport, sugar transport, amino acid transport, erythrocyte preservation, glucose metabolism, hemolysis, and erythrocyte components. R.W.H.

N65-35947# RAND Corp., Santa Monica, Calif.
THE PROBABILITY OF VISUAL DETECTION OF RECONNAISSANCE AIRCRAFT BY GROUND OBSERVERS
Doris J. Dugas Jun. 1965 66 p refs
(Contract AF 49(638)-700)
(RM-4562-PR; AD-619033)

An investigation of the ability of ground observers, unaided by optical or electronic devices, to detect visually each of six reconnaissance aircraft. Calculations are made for a variety of conditions, in altitudes, speeds, and visibilities. Among several conclusions are: (1) the probability of visual detection falls off rapidly as aircraft altitude is decreased below 2000 ft; (2) increasing speed is an effective way to reduce detectability; (3) contrast is a critical factor in determining detectability but is difficult to predict or control. Author

N65-36104* National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
EXPERIMENT M-3, INFLIGHT EXERCISER ON GEMINI IV
Lawrence F. Dietlein *In* NASA, Washington Manned Space Flight Expt. Symp., Gemini Missions III and IV [1965] p 41–48 (See N65-36100 24-30) CFSTI: HC $5.00/MF $1.25

Results of an experiment, which was designed to evaluate on a daily basis the general physical condition of the Gemini-4 flight crew with increasing time under space-flight conditions, are reported. The response of the cardiovascular system (pulse rate) to a calibrated workload was used as a basis for this evaluation. Utilizing mild exercise as a provocative stimulus, no significant decrement in the physical condition of either of the two astronauts was detected during the Gemini-4 mission. It was also found that: (1) the response of the cardiovascular system to a calibrated workload is relatively constant for a given individual during space flight, at least for missions lasting up to 4-days; and (2) the crew was able to perform mild to moderate amounts of work under the conditions of space flight and this ability continues essentially unchanged for missions of up to 4-days. S.C.W.

N65-36105* National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
EXPERIMENT M-4, INFLIGHT PHONOCARDIOGRAM
Lawrence F. Dietlein *In* NASA, Washington Manned Space Flight Expt. Symp., Gemini Missions III and IV [1965] p 49–59 refs (See N65-36100 24-30) CFSTI: HC $5.00/MF $1.25

Simultaneous electrocardiographic and phonocardiographic data were obtained from both Gemini-4 crew members. Analysis of these data revealed: no prolongation of the time interval between the onset of electrical systole (Q wave) and the onset

of mechanical systole (first heart sound); no prolongation of systole (interval between Q wave and second heart sound); and a marked diurnal rhythmicity in the pulse rate of the command pilot based on the 24-hr Cape Kennedy time cycle. Author

N65-36106* National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

EXPERIMENT M-6, BONE DEMINERALIZATION ON GEMINI IV

Paul A. La Chance, Pauline B. Mack, George P. Vose (Tex. Women's Univ.), and Fred B. Vogt (Tex. Inst. for Rehabil. and Res.) *In* NASA, Washington Manned Space Flight Expt. Symp., Gemini Missions III and IV [1965] p 61-80 refs Prepared In Part at Tex. Women's Univ. and Tex. Inst. for Rehabil. and Res. (See N65-36100 24-30) CFSTI: HC $5.00/MF $1.25

A bone demineralization study based on radiographic bone densitometry was conducted on the crew of the Gemini-4 mission. Radiographs were made of the lateral view of the foot and of the posterior-anterior view of the hand. Losses in X-ray absorbance (in terms of X-ray equivalent aluminum alloy mass) in different sites in the os calcis, ranging from 6.20 to 13.42%, were found, with losses in finger phalanx 5-2 falling within a comparable range. X-rays made of the crew at two periods postflight showed progressive increases in X-ray absorbance in these anatomical sites, which reached or approached preflight levels. Losses in X-ray absorbance as exhibited radiographically, were compared to losses in healthy young men in the Texas Women's University bed rest studies. In all cases the losses in the crew exceeded those in the bed rest subjects, indicating that restriction of body movement did not represent the sole factor involved. Other possible responsible factors are discussed, with the conclusion that further studies are needed on a larger number of subjects to isolate some of the variables, including weightlessness, which probably are operative. An important finding was that the X-ray absorption losses in bone, were recoverable within comparatively short periods of time. S.C.W.

N65-36114* Oak Ridge National Lab., Tenn.

EXPERIMENT S-4, ZERO g AND RADIATION ON BLOOD DURING GEMINI III

Michael A. Bender, P. Carolyn Gooch, and Sohei Kondo *In* NASA, Washington Manned Space Flight Expt. Symp., Gemini Missions III and IV [1965] p 217-236 refs (See N65-36100 24-30) CFSTI: HC $5.00/MF $1.25

Studies on the synergistic effect of zero-g and radiation on white blood cells, which were performed during the Gemini-3 manned space flight; are reported. Experiments consisted of the simultaneous irradiation of a series of samples of whole, human blood with $^{32}P\beta$-rays during the orbital phase of the mission. Flight-crew chromosome aberration analyses were made, and the yields of both single- and multiple-break aberrations were calculated both for the flight and for the ground control portions of the experiment. Results showed that while there was no significant difference between the yields of multiple-break aberrations, the frequency of single break aberrations was significantly higher in the flight samples. It is assumed on the basis of these data, that a synergism between radiation and some space flight parameter exists for human-chromosome aberration production. Since only single break aberrations (deletions) show this effect, it appeared that the effect is on the chromosome-rejoining system, rather than on the breakage itself. Although the experiment failed to confirm the existence of a large synergistic effect, the small positive effect demonstrated was found to be of definite scientific interest. S.C.W.

N65-36117 Joint Publications Research Service, Washington, D. C.

REGENERATION OF THE SKELETAL MUSCLES

Chu Jun *In its* Transl. on Communist China's Sci. and Techol., No. 213 2 Sep. 1965 p 24-37 refs Transl. into ENGLISH from K'o-hsueh T'ung-pao (Peking), no. 7, 20 Jul. 1965 p 618-625 (See N65-36115 24-34) CFSTI: $2.00

The literature on the research of muscle tissue regeneration is reviewed, and evidence is considered which indicates regenerative recovery of damaged tissue may occur to a limited extent. The origin of the regenerating cells, the bud formation theory, the tissue induction theory, and in-vitro culture research are discussed. E.E.B.

N65-36174# Wisconsin Univ., Madison. Medical School.

OBSERVATIONS ON ENERGY METABOLISM IN IRREVERSIBLE HEMORRHAGIC SHOCK Final Technical Report, Sep. 1, 1955-Aug. 31, 1965

Charles W. Crumpton and Helen Hift [1965] 17 p refs (Contract DA-49-007-MD-668) (AD-467957)

Irreversible hemorrhagic shock was studied in dogs and rats. In brief, we believe to have accumulated good evidence for the exclusion of both the liver and the heart from implication in the phenomenon of irreversibility in shock. Heart failure may be a factor in the death of the animal. The liver appears to operate in a cul-de-sac situation in the body of the experimental animal, but is not permanently injured on account of it. Spleen, brain and heart are depleted of norepinephrine and may, therefore, be presumed to be involved in the stress-situation which is set up by the prolonged oligemic hypotension. Liver and lung were found to retain their normal levels of catecholamines: apparently they suffer no great hardship during the oligemic period. The central volume, the closest approximation possible to the amount of blood which is actually received for ejection by the left ventricle, was found to remain remarkably constant throughout the experimental period indicating that the reinfusion requirements arose whenever blood was lost from the central circulation. It is suggested that this blood is sequestered in capillary beds which had heretofore been constricted. Finally a hypothesis is advanced which implicates insulin in the development of the severe hypoglycemia and acidosis which characterize late shock. Author

N65-36205# Joint Publications Research Service, Washington, D. C.

INSTRUCTIONS FOR THE DETERMINATION AND TREATMENT OF POISONING FROM ORGANIC PHOSPHORIC ACID ESTERS

W. D. Wiezorek, E. Herzmann, H. Matzkowski, and V. Goerisch 11 Oct. 1965 16 p Transl. into ENGLISH from Deut. Gesundheitsw. (Berlin), v. 20, no. 32, 12 Aug. 1965 p 1479-1485 (JPRS-32340; TT-65-32830)

Observations on the occurrence and progress of poisoning from commercial preparations which contain a phosphoric acid ester base are presented. Tables describing the toxicological significance of various commercial insecticides available in East Germany are included, along with recommendations for preventative measures and proposed therapeutic procedures. G.A.L.

N65-36206# Grumman Aircraft Engineering Corp., Bethpage, N. Y. Grumman Research Dept.

THE RELATIONSHIP BETWEEN VERTICAL ORIENTATION IN THE ROD AND FRAME TESTS AND VERTICAL ORIENTATION IN A COMPENSATORY TRACKING TASK

R. Benfari and P. Vitale Jan. 1965 21 p refs
(RM-260J)

A study was made to uncover the relationships between an abstract perception test of verticality and a complex task having elements of a simple task as part of its properties. Its specific purpose was to examine relationship of styles of perception orientation to performance in a complex compensatory task that required the positioning of the body or some other reference to the gravitational vertical. Results showed that the body orientation and frame orientation perceptual styles had some relationship to error scores on the kinetic and static conditions of the tracking task; body-oriented subjects were less prone to make large control displacements than frame-oriented subjects. Both groups performed better with kinetic cueing than without it, and the lack of kinetic cueing caused a larger decrement in the performance of the frame-oriented subjects than in the performance of their body-oriented counterparts. G.A.L.

N65-36223# Los Alamos Scientific Lab., N. Mex.
POSSIBLE TECHNIQUES TO AID IN ULTRASTRUCTURE ANALYSIS
J. H. Manley 28 Sep. 1965 26 p refs
(Contract W-7405-ENG-36)
(LA-3389-MS)

Preliminary results are given for a method of introduction of cesium atoms into biological specimens to obtain contrast for electron microscopy. The effect of electron heating of collagen fibrils is illustrated and discussed for the same purpose. Other methods for ultrastructure analysis are proposed. Author

N65-36226# Naval School of Aviation Medicine, Pensacola, Fla.
THE RELATIONSHIP BETWEEN PAST HISTORY OF MOTION SICKNESS AND ATTRITION FROM FLIGHT TRAINING
Charles W. Hutchins, Jr. and Robert S. Kennedy 14 Jun. 1965 9 p
(NSAM-932; AD-620375)

The Pensacola motion sickness questionnaire (MSQ) was subjected to an item analysis using successful completion of the flight training program as the criterion for item selection. The scoring key that resulted was cross-validated on a new sample and a statistically significant correlation obtained. When included in the multiple prediction formulae used at this facility to predict training success, the MSQ made significant increases in the multiple validity of the formulae for predicting both successful completion of flight training and voluntary withdrawal from training. Author

N65-36249# Naval School of Aviation Medicine, Pensacola, Fla.
A DATA PROCESSING SYSTEM FOR THE BALLISTOCARDIOGRAM
Robert L. Morse Feb. 1965 55 p refs
(NSAM-915; AD-620252)

Operation of a mathematical model of the ballistocardiogram by digital computer and other data processing facilities provides an estimate of arterial elasticity, pulse wave velocity, intra-arterial pulse wave form, and correct ordinates of the acceleration, velocity, and displacement ballistocardiogram. Author

N65-36307# Pennsylvania State Univ., University Park. Dept. of Psychology.
CLUSTERING IN FREE RECALL AS A FUNCTION OF CERTAIN METHODOLOGICAL VARIATIONS
Charles N. Cofer, Darryl R. Bruce, and Gerald M. Reicher (Mich. Univ.) Sep. 1964 22 p refs
(Contract Nonr-656(30))
(TR-3; AD-606975)

Three experiments involving category clustering in lists composed of high-frequency (HF) and low-frequency (LF) associates of the category names are reported. The major results were: (1) Block presentation augments clustering in both lists and augments word recall in HF but not in LF lists. (2) Word recall and clustering are higher in HF lists than in LF lists. (3) Duration of item presentation interval augments both clustering and word recall within limits. (4) An immediate recall augments or maintains clustering and word recall on a second recall, obtained after a short delay. (5) These findings and certain interactions are discussed with respect to the interpretation of recall of categorized lists. It is concluded that a coding hypothesis cannot do justice to all the findings. Associations between the category names and their instances or among the instances themselves are suggested as supplemental of alternative mechanisms. Author(TAB)

N65-36376# European Atomic Energy Community, Brussels (Belgium).
PHOTOSYNTHESIS AND VIRUS MULTIPLICATION IN *BRASSICA CHINENSIS* L [PHOTOSYNTHESE ET MULTIPLICATION VIRALE CHEZ *BRASSICA CHINENSIS* L]
A. Goffeau May 1964 242 p refs In FRENCH; ENGLISH summary
(EUR-1648.f) CFSTI: HC $6.00/MF $1.50

The photosynthetic reactions of healthy leaves of *Brassica Chinensis L* were compared, *in vivo* and *in vitro*, with those of leaves infected with the Turnip Yellow Mosaic virus. Chloroplasts isolated from the virus-infected leaves show a higher ATP formation rate than do the chloroplasts from healthy leaves. Furthermore, CO_2 assimilation—the chief way of utilizing photosynthetic ATP—is not stimulated neither *in vivo* or *in vitro* in the infected leaves. Hence it is not glucide synthesis that requires faster ATP formation in virus-infected plants. It appears that viral ribonucleic acid induces stimulation of photosynthetic ATP formation in the host cell, thus procuring part of the energy needed for its multiplication. Author

N65-36377# Brussels Univ. (Belgium).
STUDIES ON THE PREPARATION OF LABELLED PROTEINS AND PEPTIDES [RECHERCHES SUR LA PREPARATION DE PROTEINES ET DE PEPTIDES MARQUES]
J. Léonis Brussels, EURATOM, Jun. 1965 21 p refs In FRENCH; ENGLISH summary
(Contract EURATOM-006-61-10 RISB)
(EUR-1845-f) CFSTI: HC $1.00/MF $0.50

Several proteins of the egg white (lysozyme, ovalbumin, conalbumin, ovomucoid) can be labelled biosynthetically, by incorporating tritiated aminoacids (tyrosine, tryptophan, arginine or lysine). Specific activities range from 1 to 100 mC/mM, depending on the protein and on the precursor. Starting from lysozyme tritiated by exchange, four labelled aromatic peptides were prepared whose specific activities seem to be greater than 10 mC/mM (studies in progress). The biosynthetic incorporation of tritiated aminoacids (arginine or lysine) occurs at a different rate in the proteins of the egg white and

those of the yolk, and, for the latter, still differently in the hydrosoluble and insoluble ones. Isolation of pure labelled yolk proteins has not yet been achieved (studies in progress). Author

N65-36425*# Naval School of Aviation Medicine, Pensacola, Fla.
A THRESHOLD CALORIC TEST: RESULTS IN NORMAL SUBJECTS
Michael E. Mc Leod and Joseph C. Meek 9 Jul. 1962 11 p refs Joint report with NASA *Its* Rept. No. 72
(NASA Order R-47)
(NASA-CR-67539; AD-449842) CFSTI: HC $1.00/MF $0.50 CSCL 06P

A threshold caloric test procedure is described and the results of the test in 104 subjects are presented. The findings suggest that, in a young male population, the threshold responses to hot and cold caloric stimulation will be found within 1.5° C either side of body temperature. Threshold values greater than 1.5° C from body temperature may indicate an abnormal labyrinth. Evidence is shown which suggests that repeated threshold caloric irrigations produce little or no habituation. Author

N65-36426*# Naval School of Aviation Medicine, Pensacola, Fla.
MAGNITUDE OF GRAVITOINERTIAL FORCE, AN INDEPENDENT VARIABLE IN EGOCENTRIC VISUAL LOCALIZATION OF THE HORIZONTAL
Earl F. Miller, II and Ashton Graybiel 31 Jul. 1964 14 p refs Joint report with NASA *Its* Rept. No. 98
(NASA Order R-47)
(NASA-CR-67538) CFSTI: HC $1.00/MF $0.50 CSCL 06P

By holding the direction of gravitoinertial force (GIF) constant the effect of varying the magnitude of force from 1.0 to 2.0 G on egocentric visual localization (EVL) of the horizontal could be determined. Eight normal and two labyrinthine-defective (L-D) men served as subjects. The EVL of the horizontal was found to deviate from the gravitoinertial horizontal as a function of magnitude of the GIF. This magnitude effect tended to increase with the amount of body tilt from the gravitoinertial upright. The increase of GIF in the case of the L-D subjects resulted generally in an apparent rotation of the physical horizontal in a direction of the E- then A- phenomenon in contrast to the normal subjects who manifested ever increasing amounts of the E- phenomenon only. Based upon these findings and the assumption that the subjects differed under the experimental conditions primarily in otolithic function, the possible roles of otolithic and nonotolithic gravireceptor cues in EVL are discussed. Author

N65-36429*# Dunlap and Associates, Inc., Darien, Conn.
APPARENT MOVEMENT PHENOMENA ON CRT DISPLAYS
H. M. Bowen and G. V. Guinness Oct. 1964 76 p refs
(Contract NASw-954)
(NASA-CR-67527; DRD-64-131) CFSTI: HC $3.00/MF $0.75 CSCL 06P

The appearance of movement can occur on CRT's which use a short persistence phosphor and PRF rates between 20 and 50 cps. Analysis indicates that the apparent movement phenomena are due to movements of the eye; under suitable conditions, a stroboscopic interaction may be established between the succession of photic pulses and their impact at different locations on the retina. Symbols in an alphanumeric display can appear to jump or dance, depending upon the extent and type of eye movements. An experiment was conducted to estimate whether certain contemporary equipment which uses a P-31 fast phosphor and which evidences the phenomena in muted form is associated with lowered proficiency. We concluded that there is a high probability that when the apparent movement phenomena are present in sufficiently potent form performance will tend to degrade, especially when the observer's task is long and arduous. Author

N65-36431*# Naval School of Aviation Medicine, Pensacola, Fla.
THE EFFECTS OF VISUAL DEPRIVATION ON ADAPTATION TO A ROTATING ENVIRONMENT
Robert S. Kennedy, Gilbert C. Tolhurst, and Ashton Graybiel 18 Mar. 1965 39 p refs Joint report with NASA
(NASA Order R-93)
(NASA-CR-67537; NSAM-918) CFSTI: HC $2.00/MF $0.50 CSCL 06S

Three experiments were performed in the Slow Rotation Room to evaluate the influence of visual deprivation on several indices of adaptation to rotation. Data were obtained on tests of postural equilibrium, the Coriolis illusion, and canal sickness symptomatology. Reduction in the magnitude of the Coriolis illusion was observed whether vision was permitted or denied, but there was more variability in the latter condition. Equivalent or better postural performance was observed "without" vision, and fewer symptoms of canal sickness were observed in this mode. Author

N65-36432*# Naval School of Aviation Medicine, Pensacola, Fla.
COMPARISON OF AUTOKINETIC MOVEMENT PERCEIVED BY NORMAL PERSONS AND DEAF SUBJECTS WITH BILATERAL LABYRINTHINE DEFECTS
Earl F. Miller, II and Ashton Graybiel 15 Feb. 1962 13 p refs Joint report with NASA
(NASA Order R-47)
(NASA-CR-67520) CFSTI: HC $1.00/MF $0.50 CSCL 06N

Autokinesis as perceived by nine normals and nine bilateral labyrinthine defective (L.D.) subjects was measured by a simple and highly reliable method. Each subject participated in two trials (one sitting, the other recumbent), each of about fifteen minutes duration. The results confirmed an earlier finding that the sensory organs of the inner ear are not essential for the perception of autokinetic movement. Furthermore, the amount of angular autokinetic movement was found to be significantly greater, on the average, in the labyrinthine defective group than in the normal group of subjects. These findings suggest that the sensory input from the organs of the inner ear under the conditions of the experiment tended either directly or indirectly to stabilize the fixation target in space. No significant differences in autokinesis were manifested between the two head (body) positions for either group. Author

N65-36433*# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
STUDIES OF MANUAL CONTROL SYSTEMS Progress Report No. 7, 19 Jan.–18 Apr. 1965
10 May 1965 15 p
(Contract NASw-668)
(NASA-CR-64578) CFSTI: HC $1.00/MF $0.50 CSCL 05H

A preliminary analysis of experimental data obtained in a study of manual control systems is presented. Three classes of experimental conditions were used to investigate the difference

between single- and two-axis performance: (1) symmetric conditions, with the bandwidth of the input forcing function and the controlled dynamics the same on each axis, (2) mixed bandwidths, where the input bandwidths were dissimilar but the controlled dynamics were identical, and (3) mixed dynamics, where the input bandwidths were identical but the controlled dynamics were dissimilar. For each condition the hypothesis tested was that tracking performance in a given axis would not differ in the following two situations: (1) when that axis alone was tracked, and (2) when the two axes were tracked simultaneously. The differences between single- and two-axis performance on a normalized mean squared basis are summarized in tabular form. Results of mixed bandwidth experiments are also tabulated. C.T.C.

N65-36440*# Naval School of Aviation Medicine, Pensacola, Fla.

COMPARATIVE EFFECTS OF PROLONGED ROTATION AT 10 RPM ON POSTURAL EQUILIBRIUM IN VESTIBULAR NORMAL AND VESTIBULAR DEFECTIVE HUMAN SUBJECTS

Alfred R. Fregly and Robert S. Kennedy 23 Mar. 1965 24 p refs Joint report with NASA
(NASA Order R-93)
(NASA-CR-67122; NSAM-920; AD-617754) CFSTI: HC $1.00/MF $0.50 CSCL 06S

As a means of better understanding the role of the vestibular organs in relation to ataxic responses to prolonged rotation, two contrasting groups of subjects were studied to: (1) determine quantitatively to what extent two visually-enhanced postural equilibrium test performances of labyrinthine defective subjects (L-D's) on a single rail of optimum difficulty become disturbed along the time axis of rotation (Experiment A); and (2) compare the performances of L-D's with normals in terms of postrotation effects as studied with a new standardized ataxia test battery (Experiment B). Rotation-induced ataxia was superimposed to an appreciable extent upon the previously present and characteristic vestibular ataxia in the L-D's (Exp. A), and (in Exp. B), upon cessation, there were significant decrements on all test battery performances of the normal group, whereas in the L-D group significant decrements were observed only on the two visually-enhanced tests. Author

N65-36441*# Solid State Radiations, Inc., Los Angeles, Calif.

DEVELOPMENT OF A PERSONNEL DOSIMETRY SYSTEM FOR APOLLO Final Report

Sep. 1965 39 p
(Contract NASw-415)
(NASA-CR-65157; SSR-IF1554-65) CFSTI: HC $2.00/MF $0.50 CSCL 06R

Investigation indicates that a dosimeter for the particle energy range and levels of interest of the Apollo mission can be fabricated within the envelope, weight, and power restrictions associated with a self-contained personal dosimetry instrument. Additional reduction in size and weight and greater ruggedization may be obtained through the conversion of the remaining subminiature printed circuit board components to thin-film hybrid circuitry. Design constraints and general systems design are discussed. A section on detailed system design considers the detector, amplifier, anticipated counting rates, pulse integration, readout circuit, DC to DC converter, and primary power source. Mechanical design data, test and calibration procedures, and schematic diagrams are included. M.W.R.

N65-36506# College of Southern Utah, Cedar City.

THE EFFECTS OF X-IRRADIATION ON THE EMBRYOS OF INVERTEBRATE EMBRYOS

Wesley Larsen [1965] 9 p
(Contract AT(11-1)-1030)
(TID-21877)

The effects of x radiation at dosages ranging from 50 to 12 000 R on the development of embryos of the ovoviviparous cockroach, *Blaberus craniifer*, exposed at various ages ranging from 1 to 52 days were studied. Approximately 3750 embryos were examined and microscopic sections made of those specimens exhibiting gross deformities, cessation of growth, or abnormalities in size. Embryos were found to become resistant to x radiation suddenly just prior to the stage of dorsal closure. Embryos that had passed this stage when irradiated continued to develop normally until dosages reached levels of 2000 to 5000 R. Gross abnormalities ranged from individual slightly retarded in growth to embryos represented by an amorphous mass. Typical abnormalities found are described. Tissue cultures of heart fragments, gut sections, and Malpighian tubules of Blaberus were prepared and survived for periods varying from 5 mo to 2.5 yr. The effects of x radiation at dosages up to 93 000 rads were studied, the use of function in heart fragments in testing various radioprotective chemicals, and the effects of oxygen and hypothermia on radiosensitivity were investigated. Results are summarized. Data are also included from studies of reactions of heart fragments from embryos of Blaberus to several vital strains and the effects of various growth hormones on the growth pattern of embryonic insect organ cultures. NSA

N65-36553*# Naval School of Aviation Medicine, Pensacola, Fla.

THE EFFECTS OF EXPOSURE TO A ROTATING ENVIRONMENT (10 RPM) ON FOUR AVIATORS FOR A PERIOD OF TWELVE DAYS

Ashton Graybiel, Robert S. Kennedy, Edward C. Knoblock, Fred E. Guedry, Jr., Walter Mertz et al 30 Mar. 1965 68 p refs Joint report with NASA *Its* Rept.-111
(NASA Order R-93)
(NASA-CR-67553; NSAM-923; AD-617756) CFSTI: HC $3.00/MF $0.75 CSCL 06S

Four carefully selected military personnel undergoing flight training were exposed to constant rotation at a speed of 10 RPM for 12 days in the Pensacola Slow Rotation Room. Environmental and working conditions simulated in many respects those which might obtain in a rotating orbiting spacecraft. The findings are discussed under three headings: clinical symptoms, clinical laboratory findings, and psychophysiological performance. The experiment has demonstrated that countermeasures in addition to adaptation are needed if there is immediate exposure to rotational velocities of 10 RPM and that the rotating room is a useful device for further exploration of vestibular and central nervous system mechanisms.
Author

N65-36594*# Naval School of Aviation Medicine, Pensacola, Fla.

COMPARATIVE COCHLEAR RECONSTRUCTION IN MAMMALS

Makoto Igarashi and Toshiko Yoshinobu 11 Jun. 1965 15 p refs Joint report with NASA *Its* Rept. No. 114
(NASA Order R-93)
(NASA-CR-67573; NSAM-931) CFSTI: HC $1.00/MF $0.50 CSCL 06C

The size, length, and shape of the cochleas have been compared in different mammalian species, with the use of graphic cochlear reconstructions. The ratio between the size of the cochlea and that of the skull generally decreases when the skull size increases. In order words, the size of the cochlea in small mammals is considerably larger. The number of cochlear turns increases when the cochlea protrudes into the well-pneumatized mastoid bulla instead of being embedded in the thick otic capsule. Author

N65-36615# Argentina. Comision Nacional de Energia Atomica, Buenos Aires.
STANDARDIZATION OF THYROID UPTAKE OF I^{131} IN ACCORDANCE WITH THE RECOMMENDATIONS OF O.I.E.A. [NORMALIZACION DE LA CAPTACION TIROIDEA DE I^{131} DE ACUERDO A LAS RECOMENDACIONES DEL O.I.E.A.]
O. Degrossi, H. Forcher, and T. Watanabe 1965 13 p refs In SPANISH
(Rept.-148) CFSTI: HC $1.00/MF $0.50

Values are presented for thyroid absorption of iodine-131 for normal and thyropathic residents of more than ten years in Buenos Aires. They were obtained with a standardized absorption measuring technique using a collimator and shield of the International Atomic Energy Agency. In comparison with their standards, the values obtained had a difference of only 1%. The results were compared with values obtained by the same laboratory and those of other radioisotope laboratories in Buenos Aires using conventional collimation equipment, and with values observed in zones where the intake of iodine in the diet is considered normal and where endemic goiter exists. It was concluded that there is a relative need for iodine in the diet of people living in Buenos Aires. R.N.A.

N65-36616# Argentina. Comision Nacional De Energia Atomica, Buenos Aires.
RADIOSTRONTIUM AND STABLE STRONTIUM IN THE BONES AND DIETS OF CHILDREN [RADIOESTRONCIO Y ESTRONCIO ESTABLE EN LOS HUESOS Y DIETAS DE LOS NINOS
D. Beninson, E. Ramos, and R. Touzet 1965 15 p refs In SPANISH Presented at 2d Conf. on Fallout from Atomic Weapons, U. S. AEC, Germantown, Nov. 1964 *Its* Informe No. 149 CFSTI: HC $1.00/MF $0.50

The results of strontium-90 and natural strontium measurements in bone samples and diets of children are presented. The data show that in the first year most of the Sr^{90}/Ca in a child's diet comes from milk. Measurements taken from 1961 to 1963 show that small children's daily intake of Sr^{90} was a few picocuries and around a milligram of natural strontium. The results of Sr^{90} measurements in bone samples are tabulated by age groups. Typical levels were in the order of 1 picocurie per gram of calcium. Natural strontium in bone seems to increase slowly with age, beginning with about 0.23 milligrams per gram of calcium and reaching the adult level of around 0.4 milligrams per gram of calcium between the second and third year of life. Using a simple model and diet and bone data, the discrimination factors for distinct age groups are estimated. The estimates from Sr^{90} and natural strontium data agree and suggest that babies discriminate less against strontium than older children or adults. However, this work is of little importance in estimating the danger if the turnover of the skeletal bone is rapid during the first years of life. Transl. by R.N.A.

N65-36617# Argentina. Comision Nacional de Energia Atomica, Buenos Aires.
FATE OF SPLEEN CELLS MARKED WITH H^3-SENSITIVITY IN IN VIVO CULTURES DURING SECONDARY RESPONSE OF ANTIBODIES [DESTINO DE LAS VELULAS DE BAZO MARCADOS CON H^3-TIMIDINA EN CULTIVOS IN VIVO DURANTE LA RESPUESTA SECUNDARIA DE ANTICUERPOS]
Elmo E. Capalbo, T. Makinodan, and W. D. Gude 1965 15 p refs In SPANISH Submitted for Publication *Its* Informe No. 150 CFSTI: HC $1.00/MF $0.50

Labelled spleen cells were selectively cultured in hematopoietic tissue of strongly irradiated isologous receptors of rats. More labelled cells were detected in the spleen and bone marrow than in the lymphatic ganglions, thymus, liver, heart, or small intestine. The results suggest that spleen cells have a homing instinct in irradiated receptors. Studies of the prolific capacity of labelled lymphoid cells in the spleen receptor (labelled H^3 and counted by grains per cell) indicate that the maximum generation time for these cells can be cut in half when they are stimulated by an antigen, from 24 to 12 hours. This accelerated proliferation occurs 2 days before the appearance of the antibody in the circulation. The results also suggest that the mature plasmatic cells, following an antigen stimulation, are the result of 3 or 4 cellular divisions. R.N.A.

N65-36664# Army Medical Research Lab., Fort Knox, Ky.
REPEATED VERTICAL SEMICIRCULAR CANAL STIMULATION DOES NOT HABITUATE HORIZONTAL NYSTAGMUS IN CAT
George H. Crampton and James H. Brown 10 Feb. 1965 12 p refs Repr. from Acta Oto-Laryng., 1958 p 441–448 (Rept.-620; AD-616798)

A groups of cats were exposed to a series of angular accelerations about a vertical rotatory axis with the head tilted so that a synergic pair of vertical canals were in the plane of rotation, and then tested with the lateral canals in the plane of rotation. This group was compared with a second group that received only lateral canal stimulation, and with a third group that received neither lateral nor vertical canal stimulation. It was found that repeated acceleration of the vertical canals does not reduce that nystagmus elicited with the lateral canals accelerated in the plane of rotation. Author

N65-36707# Eidgenössische Technische Hochschule, Zürich (Switzerland).
LETHALITY AND MUTATION RATES OF NEWLY LAID *DROSOPHILA*-EGGS AFTER X-RAY RADIATION AT VARIOUS OXYGEN CONCENTRATIONS [ABTOTUNGS- UND MUTATIONSRATEN NACH RONTGENBESTRAHLUNG FRISCH ABGELEGTER *DROSOPHILA*-EIER IN VERSCHIEDENEN SAUERSTOFFKONZENTRATIONEN]
Franz Xaver Finsinger (Ph.D. Thesis) Leemann AG, 1964 23 p refs In GERMAN Repr. from Vierteljahrschr. Naturforsch. Ges. (Zürich), vol. 109, no. 3, 1964 p 175–195 (Rept.-3521) CFSTI: HC $1.00/MF $0.50

Newly laid eggs of Drosophila melanogaster in a nitrogen/oxygen mixture of varying oxygen levels were exposed to 1000 R 50-key X-radiation, and the effects on embryonic lethality, post-embryonic lethality, as well as the recessive, sex-related mutation lethality rate were observed. It was found that all three radiation effects increased with an oxygen content of 0 to 10 percent, leveled off, and remained steady throughout further increases up to 100 percent oxygen. Transl. by G.G.

N65-36722# Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.

STUDY OF MONKEY, APE, AND HUMAN MORPHOLOGY AND PHYSIOLOGY RELATING TO STRENGTH AND ENDURANCE. PHASE VI: THE MUSCULOSKELETAL ANATOMY OF THE THORAX AND BRACHIUM OF A SQUIRREL MONKEY (SAIMIRI)

William E. Edwards and Erika Fogg-Amed Jul. 1965 34 p refs Prepared under contract by W. E. Edwards, Columbia, S. C.

(Contract AF 29(600)-3466)

(ARL-TR-65-8; AD-468247)

The thoracic and brachial musculature of a female squirrel monkey (*Saimiri*) is described and illustrated by the photo-etching process. Comparisons with data from the literature on other platyrrhines and a few non-platyrrhine forms are provided. Author

N65-36724# Minneapolis-Honeywell Regulator Co., Minn. Aeronautical Div.

STUDY OF PILOT-CONTROLLER INTEGRATION FOR EMERGENCY CONDITIONS

G. Cole, M. Bender, R. Shoquist, R. Santella, D. Lovinger, et al Wright-Patterson AFB, Ohio, Res. and Technol. Div. [1963] 193 p refs

(Contract AF 33(657)-7601)

(RTD-TDR-63-4092; AD-438820)

The objective of this program was to develop a design concept which will minimize catastrophic flight control failures through appropriate pilot-controlled integration. This report describes a systematic procedure composed of techniques within the field of flight control design, reliability, and human factors which yields a practical approach for effective design of an integrated pilot-controller system. Application of the procedure was made to an advanced vehicle mission phase as an aid to the study group in determining practicality of the approach. Areas where further advances of the study are limited by the state-of-the-art are pointed out as recommendations for future investigation. Author

N65-36751*# National Aeronautics and Space Administration, Washington, D. C.

NORMAL STANDARDS OF THE SPHYGMOGRAM AND THE PULSE WAVE VELOCITY IN PERIPHERAL BLOOD VESSELS [NORMAL'NYYE STANDARTY SFIGMOGRAMMY I SKOROST' RASPROSTRANENIYA PUL'SOVOY VOLNY V PERIFERICHESKIKH SOSUDAKH]

M. A. Abrikosova and V. L. Karpman Oct. 1965 12 p refs Transl. into ENGLISH from Patol. Fiziol. i Eksperim. Terapiya (Moscow), v. 3, no. 6, 1959 p 47–53

(NASA-TT-F-9578) CFSTI: HC $1.00/MF $0.50 CSCL 06P

The authors present data on the normal standards of the pulse wave and the velocity of its spread in vessels of the extremity. These data are necessary for an objective assessment of disturbances of peripheral circulation. The amplitude of the pulse curve, as well as the pulse wave velocity spread are variable for different vascular areas of extremities. An explanation is presented of the relative increase of the volumetric sphygmogram recorded at the upper level of the shin. Author

N65-36752*# National Aeronautics and Space Administration, Washington, D. C.

PROBLEMS IN EVALUATING THE PHYSICAL FITNESS OF COSMONAUTS (BASED ON MATERIALS OF THE VOSKHOD-1 AND 2 FLIGHTS) [VOPROSY OTSENKI RABOTOSPOSOBNOSTI KOSMONAVTOV (PO MATERIALAM POLETOV VOSKHOD-1 I 2)]

P. I. Isakov, V. A. Popov, and L. S. Khachatur'yants Oct. 1965 11 p refs Transl. into ENGLISH from a paper presented at the 16th Intern. Astronautical Congr., Athens, 13–18 Sep. 1965

(NASA-TT-F-9593) CFSTI: HC $1.00/MF $0.50 CSCL 06N

The physical fitness of astronauts under conditions of weightlessness and space environment was tested in orbital flight (Voskhod-1 and 2), including visual efficiency, postural-tonic reflexes, adaptation, reaction time to stimulus, and time required to perform assigned tasks. With increase in time spent in space, the reaction times returned, from an initial rise, to ground-level values. The resolving power of the visual analysor showed no major changes, while the visual working capability declined slightly toward the end of the flight. Operative memory (skill test) and reliability margins decreased in time, with the mean-square error in orbital flight being greater than in simulators on the ground. Absence of reference points is belived to greatly affect motor coordination in walks outside the capsule, unless using cables as support lines. Author

N65-36753*# National Aeronautics and Space Administration, Washington, D. C.

PROBLEM CONCERNING DISTURBANCES OF THE LOCAL BLOOD CIRCULATION IN MAN UNDER THE INFLUENCE OF PROLONGED TRANSVERSE ACCELERATIONS [K VOPROSO O NARUSHENIYAKH REGIONARNOGO KROVOOBRASHCHENIYA U CHELOVEKA PRI DELITEL'NO DEYSTVUYUSHCHIKH POPERECHNO NAPRAVLENNYKH USKORENIYAKH]

M. D. Yemel'yanov and E. S. Kotova Oct. 1965 8 p refs Transl. into ENGLISH from a paper presented at the 16th Intern. Astronautical Congr., Athens, 13–18 Sep. 1965

(NASA-TT-F-9594) CFSTI: HC $1.00/MF $0.50 CSCL 06S

The tolerance of the human organism for protracted and repeated transverse acceleration is investigated on the basis of changes in the cardiovascular system and specifically the retinal blood supply. Opthalmodynamometer and campimeter examinations as well as centrifuge tests showed phasic changes in vascular tonus, hyper- and hypotension of local character in the optic artery, and pathological changes in the retino-brachial index. Residual reactions in the form of dilatation of the retinal veins of as much as 50 μ over normal persisted for up to 11 days after the acceleration test. Author

N65-36755*# National Aeronautics and Space Administration, Washington, D. C.

PROBLEM OF NORMALIZING LIFE-SUPPORT NOISES IN SPACECRAFT CABINS DURING PROLONGED FLIGHTS [K PROBLEME NORMIROVANIYA SHUMOV V KABINAKH KOSMICHESKIKH KORABLEY PRI DLITEL'NYKH POLETAKH]

Ye M. Yuganov, Yu. V. Krylov, and V. S. Kuznetsov Oct. 1965 16 p refs Transl. into ENGLISH from Russian Presented at the 16th Intern. Aeronautical Congr., Athens, 13–18 Sep. 1965

(NASA-TT-F-9596) CFSTI: HC $1.00/MF $0.50 CSCL 06K

The effect of high-frequency noise (up to 3000 cps) on the auditory analysor of human subjects was studied, at a total noise level of 60–76 decibels and exposure to noise up to 60 days, to determine the threshold value for life-support noise in manned spacecraft. Factors such as relative isolation, hypokinesia, restrictive clothing, capsule living conditions, and monotony of sound were taken into consideration. Continuous noise for 72 hrs raised the auditory threshold by 15–20 db and ten-day experiments resulted in an increase by 20–25 db with functional disorders of the auditory analysor after 10

days. Intermittent noise (up to 7 hrs/day) showed a cumulative effect only after months or years. A noise of 50–60 phons background for spacecraft cabins was found acceptable as both upper and lower limit, with too low a noise level considered harmful to the neuropsychic system. Author

N65-36756*# National Aeronautics and Space Administration, Washington, D. C.
PHYSIOLOGICAL REACTIONS OF MAN SUBJECTED TO ACCELERATIONS UNDER SPACE FLIGHT CONDITIONS [FIZIOLOGICHESKIYE REAKTSII CHELOVEKA PRI VOZDEYSTVII PEREGRUZOK VO VREMYA KOSMICHESKIKH POLETOV]
P. V. Vasil'yev and A. R. Kotovskaya Oct. 1965 21 p refs Transl. into ENGLISH of a paper presented at the 16th Intern. Astronautical. Congr., Athens, 13–18 Sep. 1965
(NASA-TT-F-9597) CFSTI: HC $1.00/MF $0.50 CSCL 06S

The reaction of the human organism to acceleration under space flight conditions, in group flights on Vostok and Voskhod spacecraft, is analyzed with tabulated data on physiological factors. Pulse rate and respiration rose immediately before liftoff, to a maximum in the first few 10-sec periods at still moderate acceleration. On further acceleration, both values slowed down and reached pre-liftoff level at the end of the active phase. Subsequent decline in cardiac contraction frequency was slower than in ground centrifuge tests. Ground tests showed that tolerance for acceleration of 7–8 G, after complete bedrest at practical hypokinesis of 20 days, decreased to 4–6 sec as against 4–5 min in the controls, thus possibly explaining the observed reduced tolerance for acceleration on re-entry after prolonged space flight. Author

N65-36759*# National Aeronautics and Space Administration, Washington, D. C.
CEREBRAL ANEMIA AND CONGESTION, MECHANICALLY PRODUCED IN ANIMALS BY VERTICAL POSITION OR BY GYRATORY MOTION [DE L'ANEMIE ET DE LA CONGESTION CEREBRALES PROVOQUEES MECANIQUEMENT CHEZ LES ANIMAUX, PAR L'ATTITUDE VERTICALE OU PAR UN MOUVEMENT GIRATOIRE]
A. Salathé Oct. 1965 23 p refs Transl. into ENGLISH from Physiol. Exptl. (France), v. 3, 1877 p 251–272
(NASA-TT-F-9715) CFSTI: HC $1.00/MF $0.50 CSCL 06S

Protracted maintenance of various body positions, in its influence on blood circulation in the brain, was investigated in human and animal experiments, with recordings of respiration and cardiac stroke volume. Vertical position, with elevated head, resulted in progressive reduction of respiration and cardiac rhythm, ending in syncope and death due to bulbar anemia. Vertical position with the head downward resulted only in minor symptoms of congestion. Restoration to horizontal resuscitated the animals from apparent death. In centrifuge tests, position of the head toward the center produced death within a few minutes, while the animals survived for twice this time in the inverse position. Recumbent position in human subjects was found optimum for preventing syncope or suspension of cardiac action under extreme stresses. Author

N65-36764*# Stanford Research Inst., Menlo Park, Calif.
EXPERIMENTS IN TACTUAL PERCEPTION
James C. Bliss and Hewitt D. Crane Washington, NASA, Nov. 1965 194 p refs
(Contracts NAS2-1679; AF 33(615)-1099)
(NASA-CR-322) CFSTI: HC $6.00/MF $1.25 CSCL 06B

Several psychological experiments, conducted in a study on tactile perception and communication, are described, along with the instrumentation and equipment used. Results of an experimental session, in which words, sentences, and paragraphs were transmitted by a tactile display, showed that subjects were able to read tactually from these displays at a rate of 20 words per minute after less than 20 hours of training. A specially designed tactile alphabet was developed, with such factors considered as learnability, edge effects, letter packing, and number of fingers used. It was found that tactually naive subjects were able to identify these letters correctly at a rate of about two random letters a second after 25 hours of practice. In studies of two-dimensional compensatory tracking with a continuous visual display, a discrete visual display, and a discrete tactile display, the performance with the tactile and discrete visual displays was about equal. A series of phenomenological observations and quantitative studies are also described. M.G.J.

N65-36768*# Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
THE EFFECT ON THE CHIMPANZEE OF RAPID DECOMPRESSION TO A NEAR VACUUM
Alfred G. Koestler, ed. Washington, NASA, Nov. 1965 114 p refs
(NASA Order T-272109)
(NASA-CR-329) CFSTI: HC $4.00/MF $0.75 CSCL 06S

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4. PHYSICAL ENVIRONMENT T. D. Magnuson and T. L. Dobson p 99–106 (See N65-36772 24-05)

N65-36769* Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
PERFORMANCE
Alfred G. Koestler, Herbert H. Reynolds, Lewis M. Barker, Neil D. Catone, and Gordon L. Wilson *In its* Effect on the Chimpanzee of Rapid Decompression to a Near Vacuum Nov. 1965 p 1–52 refs (See N65-36768 24-04) CFSTI: HC $4.00/MF $0.75

Eight chimpanzees, used in nine separate tests, were decompressed from 179 mm Hg (breathing 100 percent O_2) to less than 2 mm Hg in 0.8 seconds and remained at this altitude from 5 to 150 seconds. After recompression to 179 mm Hg (again breathing 100 percent O_2), the subjects were kept at this altitude for 24 hours. Performance by all animals, on a complex operant schedule presented during and following rapid decompression, reached a baseline level of performance within a 4-hour post-decompression period. No central nervous system damage (as measured by performance) could be detected and all subjects survived in good health. Author

N65-36770* Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
PHYSIOLOGY

Loyd M. Stephens, John L. Hartman, Oliver F. Lewis, and John M. Rhodes (New Mexico Univ.) *In its* Effect on the Chimpanzee of Rapid Decompression to a Near Vacuum Nov. 1965 p 53–79 refs (See N65-36768 24-04) CFSTI: HC $4.00/MF $0.75

Cortical EEG, ECG, and respiration were recorded from immature chimpanzees before, during, and following rapid decompression to a near vacuum of less than 2 mm Hg. Subjects remained at this pressure altitude for up to two and one-half minutes. Visual analysis of the physiological parameters, as recorded on strip chart, was conducted and a correlation of these results to the animal's performance ability was attempted. EEG fast activity (10–12 cps) always preceded the end of total performance impairment. The continuous avoidance baseline level of response followed the return of EEG normalcy. Author

N65-36771* Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
EXPERIMENTAL SURGERY AND CLINICAL EVALUATION
Jerry Fineg, Donald C. Van Riper, Phillip W. Day, and James R. Prine *In its* Effect on the Chimpanzee of Rapid Decompression to a Near Vacuum Nov. 1965 p 81–98 refs (See N65-36768 24-04) CFSTI: HC $4.00/MF $0.75

Surgical procedures are outlined for implanting chronic cortical leads in the chimpanzee. Criteria for physical evaluation of the subjects are presented. All subjects showed slight neutrophilia, increased transaminase levels and facial edema, which were transient in nature and returned to normal within 72 hours after decompression to less than 2 mm Hg. There seems to be no lasting effect of rapid decompression exposure to a near vacuum. Author

N65-36772* Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
PHYSICAL ENVIRONMENT
Thomas D. Magnuson and Thomas L. Dobson *In its* Effect on the Chimpanzee of Rapid Decompression to a Near Vacuum Nov. 1965 p 99–106 (See N65-36768 24-04) CFSTI: HC $4.00/MF $0.75

A decompression chamber, life support equipment, and other instrumentation are pictured and described. The equipment is used for studying the effects on the physiology, performance, and behavior of chimpanzees subjected to rapid decompression to a near vacuum with subsequent recompression. The conditions used for nine tests are tabulated. Temperature, relative humidity, and percent oxygen values are included in the tabulation. L.S.

N65-36773*# Bunker-Ramo Corp., Canoga Park, Calif.
PILOT RE-ENTRY GUIDANCE AND CONTROL
Albert B. Miller Washington, NASA, Nov. 1965 45 p refs (Contract NASw-869)
(NASA-CR-331) CFSTI: HC $2.00/MF $0.50 CSCL 05H

The present paper considers some of the problems confronting the pilot during a manually controlled re-entry, and some of the areas where additional research could most profitably contribute to a more complete knowledge of manual control. The relationship between re-entry vehicle configuration and the nature and severity of the manual control maneuvers is discussed in terms of the energy available to control the vehicle, and the display-control relationship as they relate to the functions performed by the human operator. The importance of training through simulation is stressed and some of the areas where additional simulation studies are needed is pointed out. It is shown that the problem of escape continues to be a critical problem which requires considerable effort if a solution is to be attained. With regard to future needs, it is pointed out that simulation studies will continue to be one of the most important vehicles for research into manual control problems and that many more studies of the basic behavioral components of manual control are needed in order to develop more complete models of the human control process. Author

N65-36786# Honeywell, Inc., St. Paul, Minn.
VISUAL SEARCH: EYE FIXATIONS AS DETERMINED BY INSTRUCTED TARGET CHARACTERISTICS Semi-annual Report, 1 Jan.–30 Jun. 1965
L. G. Williams 12 Aug. 1965 7 p ref
(Contract Nonr-4774(00))
(T-125; AD-620336)

With prior instruction about single target characteristics, searcher's eye fixations tended strongly to fall on objects of instructed color, but tended less to fall on instructed size or shape. In general, when instructed about multiple target characteristics, fixations were related to a single characteristic, color if provided, otherwise size. Author (TAB)

N65-36894*# National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY—A CONTINUING BIBLIOGRAPHY WITH INDEXES
Sep. 1965 156 p
(NASA-SP-7011(15)) CFSTI: HC $1.00/MF $1.00 CSCL 06

Considerable emphasis is given to biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar or actual effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. The emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion. R.W.H.

N65-36895*# National Aeronautics and Space Administration, Washington, D. C.
ELECTRICAL MORPHEUS [ELEKTRICNI MORFEJ]
Oct. 1965 6 p Transl. into ENGLISH from Savremena Tehnika (Yugoslavia), no. 8, 1965 p 294–5
(NASA-TT-F-9743) CFSTI: HC $1.00/MF $0.50 CSCL 06B

Considerable success with a new electrical sleeping machine is stated by its users in Graz, Austria. The machine produces impulses of 36 to 230 cps of duration 0.4 to 1.4 μsec to 4 electrodes in a face mask; output maximum is 34 v. Daily treatment lasts from 1 to 2 hours and boasts good results for a wide spectrum of disorders. Author

IAA ENTRIES

A65-34670
FREE AMINO-ACIDS ON HUMAN FINGERS - THE QUESTION OF CONTAMINATION IN MICROANALYSIS.
J. Oró and H. B. Skewes (Houston, University, Dept. of Chemistry, Houston, Tex.).
Nature, vol. 207, Sept. 4, 1965, p. 1042-1045. 13 refs.
Grant No. NsG 257-62.

Chromatographic study of the free amino acids present on human fingers as a contamination factor, especially as applied to microanalysis of such acids on carbonaceous chondrites. Details of the collecting and processing of the test materials from the fingers of seven subjects are presented. It is found that the composition of free amino acids on the surface of human fingers appears to be essentially constant, not only qualitatively but also in terms of their relative abundance, and it is noted that the most impressive similarity between the analyses is the apparent constancy in the relative concentrations of amino acids. Data from similar analyses of meteorites are compared, and it is concluded that the bulk of the free amino acids found in the analyses is the result of contamination in handling the meteorites. M.L.

A65-34677
METHODS OF PREDICTING HUMAN RELIABILITY IN MAN-MACHINE SYSTEMS.
David Meister (Bunker-Ramo Corp., Systems Effectiveness Dept., Canoga Park, Calif.).
Human Factors, vol. 6, Dec. 1964, p. 621-646. 34 refs.

Review and evaluation of four studies describing the development and application of a simple multiplicative probability model for human error prediction. The methodology is an elementaristic one that requires analysis of system operations to the task-element level. Estimates of human performance reliability are applied through the use of the Data Store, which is based on extrapolation of results from 164 experimental studies. The various probabilities of operator action are explored in detail through a "probability" tree; each branch of the tree represents an alternative contingency. Performance reliabilities for task elements are progressively combined through the use of the series product rule to yield reliability estimates for tasks, mission phases, and the overall system. The methodology has been applied in two contexts: the generation of reliability estimates through a computerized Monte Carlo program and by using experts' rating of operator performance. (Author) M.F.

A65-34678
QUANTIFICATION OF HUMAN PERFORMANCE IN LARGE, COMPLEX SYSTEMS.
E. W. Pickrel and T. A. McDonald (Douglas Aircraft Co., Inc., Missile and Space Systems Div., Santa Monica, Calif.).
(Symposium and Workshop on the Quantification of Human Performance, University of New Mexico, Albuquerque, N. Mex., Aug. 1964, Paper.)
Human Factors, vol. 6, Dec. 1964, p. 647-662. 21 refs.

Proposal of a method for the identification of human-induced equipment failures in complex systems. This method requires a description of the tasks to be performed, the determination that the tasks can be performed in the time available, and finally a specification of task criticality. The probability of error occurrence and estimation of the effect of potential errors are also major parts of the analysis. Efforts for failure reduction are concentrated on errors most likely to occur and to affect the system negatively. (Author) M.F.

A65-34679
FIELD MEASUREMENT OF HUMAN PERFORMANCE IN MAN-MACHINE SYSTEMS.
Gerald F. Rabideau (Bunker-Ramo Corp., Canoga Park, Calif.).
Human Factors, vol. 6, Dec. 1964, p. 663-672. 19 refs.

Study of the field evaluation of human performance which is rapidly assuming a role of major importance in system measurement. However, the special conditions under which such ecological tests must be performed impose certain limitations upon the evaluator which must be recognized. These limitations involve restrictions on the opportunity to manipulate variables, which lead to greater use of subjectively oriented data collections tools - e.g., the human observer, the interview, and checklists. Factors to be considered in the planning of a field test are discussed. (Author) M.F.

A65-34680
INDIVIDUAL AND SITUATIONAL VARIABLES AFFECTING HUMAN PERFORMANCE.
Claude T. Ware, Jr. (Douglas Aircraft Co., Inc., Missile and Space Systems Div., Santa Monica, Calif.).
Human Factors, vol. 6, Dec. 1964, p. 673, 674.

Criticism of present methods of measuring and predicting operator performance because of their failure to consider individual and situational variables which mediate that performance. (Author) M.F.

A65-34681
ARE BALLISTIC MISSILE TEST PROGRAMS STRUCTURED TO SUPPORT ADEQUATE EVALUATION OF HUMAN PERFORMANCE?
Kenneth H. Borchers (Space Technology Laboratories, Inc., San Bernardino, Calif.).
Human Factors, vol. 6, Dec. 1964, p. 675-679. 10 refs.

Exploration of the problem of the adequacy of personnel performance testing on a current Ballistic Missile Test Program. It advances the thesis that criteria for judgment of technical worth must consider program/system requirements and cost-effectiveness. Examples of three categories of human performance testing on the Minuteman ballistic missile program are described. (Author) M.F.

A65-34682
SOME PROBLEMS IN THE MEASUREMENT OF HUMAN PERFORMANCE IN MAN-MACHINE SYSTEMS.
Alan D. Swain (Sandia Corp., Reliability Dept., Albuquerque, N. Mex.).
Human Factors, vol. 6, Dec. 1964, p. 687-700. 43 refs.

Study of quantification of human performance in man-machine systems. Obstacles to such quantification include (1) complexity and subjectivity of available quantification methods, (2) grossness of assumptions behind these methods, and (3) resistance of some psychologists. Research is needed to develop an improved human performance data bank, to develop improved models and methods, and to validate quantification data, models, and methods. (Author) M.F.

A65-34697
MANNED CONTROL - DIRECT AND REMOTE.
A. M. Mayo (Ling-Temco-Vought, Inc., LTV Astronautics Div., Dallas, Tex.).
Society of Automotive Engineers, National Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 4-8, 1965, Paper 650811. 7 p. 31 refs.
Members, $0.75; nonmembers, $1.00.
Contracts No. NASw-611; No. NAS 2-2148; No. NAS 2-2853.

Discussion of current developments in the utilization of man as part of automatic, remotely controlled, and directly manned space exploration systems. These systems are defined, and such factors as required information, its form, and human and machine constants are described. Significant differences of the systems are outlined, and some basic hazards of manned systems are categorized. B.B.

A65-34946 #
RESULTS OF SOME ELECTROPHYSIOLOGICAL INVESTIGATIONS ON BOARD THE SPACESHIP "VOSKHOD" [REZUL'TATY NEKOTORYKH ELEKTROFIZIOLOGICHESKIKH ISSLEDOVANII NA KORABLE "VOSKHOD."].

I. T. Akulinichev, V. V. Bogdanov, D. G. Maksimov, and I. I. Popov (Akademiia Nauk SSSR, Moscow, USSR).
International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper. 21 p. 8 refs. In Russian.

Discussion of electrophysiological tests performed on board Voskhod 1 (1964 65A). Test procedures are outlined, and a description is given of an apparatus (termed "Polynom") for recording the electroencephalograph, electrooculogram, dynamogram, and the coordination of motions in writing of each of the three astronauts. Some information on the activity of eye movement and the excitability of the vestibular apparatus, obtained from the electrooculograms is given, together with estimates obtained from the electroencephalograms of the exciting and inhibiting processes in the cerebral cortex. The recorded changes in the physiological parameters were of a functional nature reflecting the adaptation of the human organism to the spaceship environment. V. P.

A65-34947 #
PHYSIOLOGICAL REACTIONS OF MAN TO THE EFFECT OF OVERLOAD DURING SPACE FLIGHT [O FIZIOLOGICHESKIE REAKTSII CHELOVEKA PRI DEISTVII PEREGRUZOK VO VREMIA KOSMICHESKIKH POLETOV].
P. V. Vasil'ev and A. R. Kotovskaia (Akademiia Meditsinskikh Nauk, Otdelenie Mediko-Biologicheskikh Nauk, Moscow, USSR).
International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper. 27 p. 27 refs. In Russian.

Discussion of in-flight and laboratory tests of the effect of overloads on the human organism. A comparison between the physiological reactions of cosmonauts to the effects of overloads during launching and reentry and the results of laboratory (centrifuge) tests showed that all cosmonauts experienced approximately the same sensation during the launching phase as on the centrifuge. It is found that the higher pulse and respiration rate observed during the prelaunch phase continued to increase when the vehicle was launched. These parameters attained their highest values during the initial seconds of the flight, when the overloads were still comparatively low. With increasing overloads, however, the physiological reactions gradually declined. The change in vegetative functions observed with the Vostok series was appreciably higher than for the Voskhod series. This is explained by the higher nervous-emotional tension during single than during two- and three-man flights. The vegetative reactions were generally more pronounced during reentry than during the launching phase. The pulse of some cosmonauts reached from 184 to 190 beats per minute and was higher than under analogous overloads on a centrifuge. Moreover, most of the astronauts experienced visual disturbances (in the form of a "gray film") that were not observed in centrifuge tests. V. P.

A65-34985 #
SELF-ADAPTIVE RETINAL PROCESSES AND THEIR IMPLICATIONS TO ADAPTIVE CONTROL.
J. J. Kulikowski (Institute of Automatic Control, Warsaw, Poland).
IN: INTERNATIONAL FEDERATION FOR AUTOMATIC CONTROL, SYMPOSIUM ON THE THEORY OF SELF-ADAPTIVE CONTROL SYSTEMS, TEDDINGTON, MIDDX., ENGLAND, SEPTEMBER 14-17, 1965. [A65-34981 23-10]
London, Society of Instrument Technology, 1965, p. 2.1-1 to 2.1-7. 6 refs.

Description of some nonlinear autonomic control processes in the retina and of their possible relevance to adaptive control systems. The activities considered involve the lowest level of visual data processing and play the role of the goal-seeking element. Mathematical models of these processes are reviewed, and their possible use for the development of preprocessors which adapt to various operating conditions and reduce the amount of data flow in an optimal way is discussed. P. K.

A65-34986 #
ADAPTIVE FUNCTIONS OF MAN IN VEHICLE CONTROL SYSTEMS.
Y. T. Li, L. R. Young, and J. L. Meiry (Massachusetts Institute of Technology, Dept. of Aeronautics and Astronautics, Cambridge, Mass.).
IN: INTERNATIONAL FEDERATION FOR AUTOMATIC CONTROL, SYMPOSIUM ON THE THEORY OF SELF-ADAPTIVE CONTROL SYSTEMS, TEDDINGTON, MIDDX., ENGLAND, SEPTEMBER 14-17, 1965. [A65-34981 23-10]
London, Society of Instrument Technology, 1965, p. 2.2-1 to 2.2-2.

Brief review of the capabilities of man as an adaptive controller in high-performance vehicles. Covered are the general human adaptive control patterns and characteristics, human control in coupled multiloop systems, and the limits of human adaptation. P. K.

A65-34987 #
AUTONOMIC CONTROL OF RESPIRATION.
W. Fincham and I. P. Priban (National Physical Laboratory, Teddington, Middx., England).
IN: INTERNATIONAL FEDERATION FOR AUTOMATIC CONTROL, SYMPOSIUM ON THE THEORY OF SELF-ADAPTIVE CONTROL SYSTEMS, TEDDINGTON, MIDDX., ENGLAND, SEPTEMBER 14-17, 1965. [A65-34981 23-10]
London, Society of Instrument Technology, 1965, p. 2.3-1 to 2.3-6.

Description, in engineering terms, of the autonomic control procedures of the human respiratory system. The manner in which the level of ventilation (total air intake) is controlled by blood chemistry is examined. The neuromuscular mechanism which selects those values of tidal volume and frequency of breathing which minimize the energy expenditure of the respiratory muscles is described. P. K.

A65-34988 #
METABOLIC CONTROL IN THE MAMMALIAN MICROCIRCULATION.
A. S. Iberall and S. Z. Cardon (General Technical Services, Inc., Yeadon, Pa.).
IN: INTERNATIONAL FEDERATION FOR AUTOMATIC CONTROL, SYMPOSIUM ON THE THEORY OF SELF-ADAPTIVE CONTROL SYSTEMS, TEDDINGTON, MIDDX., ENGLAND, SEPTEMBER 14-17, 1965. [A65-34981 23-10]
London, Society of Instrument Technology, 1965, p. 2.4-1 to 2.4-8. 11 refs.
Contract No. NASw-1066.

Description of a model for the adaptive control system which regulates the metabolic oxygen flow to the skeletal muscles. This system is taken to be illustrative of mammalian microcirculatory systems. It is suggested that the local flux of oxygen to the muscle tissue controls in an active mode the level of energy transformation by the tissue. The manner in which this control is adaptive is discussed. P. K.

A65-35004 #
SOME QUESTIONS OF LEARNING OPTIMISATION OF LARGE-SCALE PROCESSES.
M. Orbán.
IN: INTERNATIONAL FEDERATION FOR AUTOMATIC CONTROL, SYMPOSIUM ON THE THEORY OF SELF-ADAPTIVE CONTROL SYSTEMS, TEDDINGTON, MIDDX., ENGLAND, SEPTEMBER 14-17, 1965. [A65-34981 23-10]
London, Society of Instrument Technology, 1965, p. 7.2-1 to 7.2-10. 6 refs.

Description of procedures for designing self-adaptive controls for large-scale complex processes having a priori unknown properties. The manner in which a self-adaptive system searches out the information it needs and "learns" from its past experience is reviewed. Some analogies between the learning processes in technical control systems and living organisms are noted. P. K.

A65-35107 #
NEW NOSOLOGICAL CONSIDERATIONS IN WEIGHTLESS MAN.
Constantine D. J. Generales, Jr.
International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper. 18 p.

Discussion of problems connected with man's adaptation to weightlessness. It is noted that, no matter how thoroughly an astronaut is selected and trained, he will be medically vulnerable and will require medical care during extended stays in space. The examining physician or team of medical experts, whether receiving

data by telemetry or during personal attendance, must have an understanding of the way in which organic disease presents itself under conditions of weightlessness. Physical diagnosis based on direct observation, palpation, and auscultation and supported by ancillary visual methods such as roentgenography will present a totally different picture of the ailing spaceman. The more common physical properties or factors involved in the normal and pathological physiology of the human body in the study of disease affecting man in conditions of weightlessness are discussed. It is concluded that the question of whether man will need the full equivalent or a fraction of the terrestrial gravitational force, or can dispense with it completely without ill effects, or whether he should grow up in weightlessness from birth, is a moot question that will take at least one generation to solve. M.M.

A65-35114
COMPATIBILITY OF STERILIZATION AND CONTAMINATION CONTROL WITH APPLICATION TO SPACECRAFT ASSEMBLY.
Robert R. Ernst and Albert P. Kretz, Jr. (Wilmot Castle Co., Research Laboratory, Rochester, N.Y.).
American Association for Contamination Control, Journal, vol. 3, 1964. 6 p. 7 refs.
Grant No. NsG(T)-73.

Discussion of problems of spacecraft sterilization. Attention is focused on observations concerned with the possible concentration of microbiological particles on objects assembled under present cleanroom and clean work-station conditions. Experiences and data are reported which show that airborne charged particles have a great affinity for electrostatic surfaces. Relatively high charge densities are associated with particles in the size range of the smaller bacteria and spores, and the ratio of charged to uncharged particles is very high. Small particles having a high charge density may have significantly high mobilities even in a low electrostatic field. Many of the dielectric materials that would serve as charged acceptors for electrostatic particles are usually those having a low heat conductivity as well. Therefore, the philosophy of using cleanroom or clean-work station techniques in the assembly of space landers may not be compatible with a terminal heat treatment for sterilization. It is possible that certain susceptible areas in an assembly might preferentially adsorb high levels of viable contamination. A complete and absolute barrier system for such assembly procedures is strongly recommended. M.M

A65-35148 #
HUMAN ADAPTABILITY TO MILITARY SPACE SYSTEMS.
Gerald W. Parker, Bryce O. Hartman (USAF, Systems Command, Aerospace Medical Div., Wilford Hall Hospital, Lackland AFB, Tex.), and John W. Ord (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Psychiatry Branch, Psychobiology Section, Brooks AFB, Tex.).
Air University Review, vol. 12, Sept.-Oct. 1965, p. 29-40.

Review of the problems of human adaptability to space flight. The early orbiting of organisms, animals, and humans is considered, and hostile environmental factors and costs of space missions are discussed. The physiological problems caused by gravity, weightlessness, acceleration, and impact are studied, and experimental results pertaining to these problems are examined. Such psychological problems as emotional alterations in response to unusual environments, optimal work/rest schedules, and maintenance of efficiency over long periods of time are surveyed, and the overall concept of the utility of man in space is analyzed. B.B.

A65-35171
MINIMUM ATTENTION DISPLAY TECHNIQUES.
Ronald J. Massa and Robert Keston (Laboratory for Electronics, Inc., Boston, Mass.).
Navigation, vol. 12, Summer 1965, p. 153-163. 21 refs.

Discussion of a new display concept termed the "minimum-attention display" which is a result of techniques that permit maximum transfer of guidance information to the observer without excessive sensory commitment to the display. The display problem is investigated, together with sensory input mechanisms and minimum-attention displays. Finally some potential applications are outlined, and it is concluded that such displays would be of prime usefulness in lunar landing, space rendezvous, and virtually every sophisticated guidance problem where instruments are used to augment direct visual contact. B.B.

A65-35251 #
PROBLEMS OF ASSESSING ASTRONAUTS' WORK CAPACITY (FROM MATERIALS OBTAINED DURING THE FLIGHTS OF VOSKHOD 1 AND 2) [VOPROSY OTSENKI RABOTOSPOSOBNOSTI KOSMONAVTOV (PO MATERIALAM POLETOV "VOSKHOD-1 I 2")].
P. T. Isakov, V. A. Popov, and L. S. Khachatur'iants (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR).
International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper. 11 p. 8 refs. In Russian.

Discussion of test programs carried out on board the spaceships Voskhod 1 (1964 65A) and Voskhod 2 (1965 22A) to determine the efficiency of an astronaut in performing working operations with a view toward establishing the type and scope of operations that an astronaut may be expected to perform during future missions. The results of these tests indicate that the control activity of an operator is somewhat inhibited during the first phases of the flight; this is explained by the transition from a high-g condition to a weightless state, the onset of the adaptation phase, and by a rise in emotional tension during the first hours of the flight. Visual resolving power undergoes only slight changes. The largest changes, observed for all crew members, are in the qualitative analysis of operational memory. In general, all elements of activity prediction obtained in laboratory conditions vary somewhat from the results obtained in conditions of space flight. V.P.

A65-35253 #
FIRST WALK IN SPACE BY MAN [PERVYI VYKHOD CHELOVEKA V KOSMICHESKOE PROSTRANSTVO].
A. A. Leonov (Ministerstvo Oborony SSSR, Voenno-Vozdushnye Sily, Moscow, USSR).
International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper. 13 p. In Russian.

Leonov's description of his walk in space performed during the flight of Voskhod 2 (1965 22A). Leonov emphasizes the importance of the very thorough and detailed training he and Beliaev were given in preparation for the flight. Every motion he was required to perform in space and when leaving and entering the trap had been coordinated to perfection in aircraft flying parabolic curves and various other special simulators. The actual "walk in space," therefore, seemed to him a matter of routine; even the moment of separation from the vehicle was not accompanied by an increase in emotional tension. The only difficulty he experienced was reentering the trap, armed with a camera that had been filming him after detaching it from the vehicle. Leonov describes the effects of a floating astronaut on the orientation of the vehicle, stating that he was able to change at will its attitude. Leonov confirms the importance that, in training, had been placed on the adaptation of the astronaut to a reference system of coordinates (in his case the spaceship coordinates) for orientation in conditions of weightless floating. He asserts that his senses were not affected by his experience and that his ability to perform working operations had not suffered either during or after this excursion. V.P.

A65-35254 #
FLIGHT OF VOSKHOD 2 [POLET KOSMICHESKOGO KORABLIA "VOSKHOD-2"].
P. I. Beliaev (Ministerstvo Oborony SSSR, Voenno-Vozdushnye Sily, Moscow, USSR).
International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper. 12 p. In Russian.

Beliaev's description of the 17-orbit flight with Voskhod 2 (1965 22A) during which his copilot, Leonov, left the vehicle to float in space. The brief description includes rough particulars on spaceship design and the control and life support equipment. It is noted that the conditions in the cabin allowed the astronauts to discard their

gloves and helmets during work. Also the food rations were of the type normally used on earth. During the period Leonov spent beyond the spaceship, Beliaev was in telephone communication with him, could observe his motions on TV, and check his pulse and breathing as well as the functioning of his space life-support equipment. Leonov's movements when leaving and entering the trap were accompanied by a slight rotation of the vehicle. His contacts with the spaceship were clearly audible inside the vehicle. In case of emergency, the pilot would have been able to come swiftly to the rescue of his companion. Thanks to an extensive training program in which the cosmonauts participated even during the design stage, no difficulties were encountered in carrying out the program of the flight. During reentry, the manual controls and the parachute and soft-landing systems functioned perfectly, so that only a slight increase in pulse rate was observed. V. P.

A65-35255 #
THE PROBLEM OF NORMALIZING NOISE PRODUCED BY LIFE-SUPPORT SYSTEMS IN SPACESHIP CABINS DURING PROLONGED FLIGHTS [K PROBLEME NORMIROVANIIA SHUMOV SISTEM ZHIZNEOBESPECHENIIA V KABINAKH-KOSMICHESKIKH KORABLEI PRI DLITEL'NYKH POLETAKH].
E. M. Iuganov, Iu. V. Krylov, and V. S. Kuznetsov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR).
International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper. 23 p. 20 refs. In Russian.

Discussion of 92 experiments performed with 63 subjects to determine the effect of noise on the state of being and capacity for work of astronauts. As distinct from earlier investigations in which noise levels between 30 and 40 db had been recommended, it is found that continuous high-frequency noise of an intensity of 60 to 65 db could be endured without discomfort for periods on the order of 60 days. For spaceships having several compartments, these noise levels should be maintained in the pilot's cabin and the compartment designed for sleep whereas compartments in which the prolonged presence of an astronaut is not required can have considerably higher noise levels. V. P.

A65-35344
SAMPLING THEORY FOR THE HUMAN VISUAL SENSE.
John Merchant (Honeywell, Inc., Radiation Center, Boston, Mass.)
Optical Society of America, Journal, vol. 55, Oct. 1965, p. 1291-1295.
Contracts No. NASr-16; No. NASw-535.

Study of the nature of the sampling operation performed by the human visual sense, restricted to black and white, nonstereoscopic, photopic vision. The hypothesis is presented that the human visual sense samples the spatial "power" spectrum of the input image, just as the aural sense samples the temporal power spectrum of the input sound. The term spatial power spectrum is used throughout to describe the absolute value of the square of the Fourier spatial transform of the image, although it is recognized that the word "power" is, strictly, a misnomer in this context. It is to be particularly noted that the word spectrum does not, here, refer to the electromagnetic frequency spectrum of the radiation associated with the image but to the spatial frequency spectrum of the pattern structure of the image. The justification for this hypothesis is the fact that the sensitivity of the retina (except at the fovea) to form, or pattern, in the input image is very much poorer than is suggested by the corresponding upper cutoff spatial frequency of the retina. This property is characteristic of power-spectrum sensitive devices. A physical model retina is described that could perform the hypothesized spectral-sampling operation. (Author) M.F.

A65-35345
STATIC AND DYNAMIC VISUAL FIELDS IN HUMAN SPACE PERCEPTION.
Donald A. Gordon (U.S. Maritime Administration, Traffic Systems Div., Washington, D.C.).
Optical Society of America, Journal, vol. 55, Oct. 1965, p. 1296-1303. 29 refs.

Discussion of human space perception in the context of the environmental geometry around a moving eye. It is shown that the interpretive scaling of visual angle is a key factor in size, distance, and motion estimation. The analysis of the velocity-vector pattern indicates that, contrary to the motion-parallax cue to distance suggested by Helmholtz, the pattern would not reveal distance, particularly on a curved trajectory. It is pointed out that the angular acceleration of an environmental point, seen by a moving eye, increases as the square of velocity. The consequences of this relationship for the perception of speed are indicated. The pattern of the angular-acceleration field does not appear to resemble any familiar pattern of visual experience. Evidence is therefore provided that acceleration is not directly sensed. (Author) M.F.

A65-35473
A HUMAN-FACTORS EVALUATION OF SWITCH ACTUATORS FOR USE IN SPACECRAFT.
Donald H. Schuster (Collins Radio Co., Cedar Rapids, Iowa).
IEEE Transactions on Human Factors in Electronics, vol. HFE-6, Sept. 1965, p. 33-42. 11 refs.
Apollo Contract No. M2H43X-406 002.

Investigation of the characteristics of switch actuators for communications equipment to be used in spacecraft. Subjects operated common switch actuators with spacesuit gloves, under both atmospheric pressure and two-psi pressure differential. The independent variables studied were type of actuator, direction of operation, actuating torque, number of switch positions, effect of pressure, practice effect, and position on the panel. The dependent variables (criteria) were operating time, errors, and ranks. Switch actuators, in general, were operated more slowly and with more errors under simulated spacecraft conditions than under ordinary conditions. It was found that multiposition switches must have firm detent or interlocking features to prevent overshoot or accidental reversal. The best switch actuator under all circumstances combined is illustrated. (Author) M.F.

A65-35474
MATHEMATICAL MODELS OF HUMAN OPERATORS IN SIMPLE TWO-AXIS MANUAL CONTROL SYSTEMS.
G. A. Bekey (Southern California, University, Los Angeles, Calif.), H. F. Meissinger, and R. E. Rose (Space Technology Laboratories, Inc., Redondo Beach, Calif.).
IEEE Transactions on Human Factors in Electronics, vol. HFE-6, Sept. 1965, p. 42-52. 16 refs.
Contract No. NAS 1-2582.

Application of continuous parameter optimization techniques to the synthesis of a model of human tracking behavior in a simple two-axis task. Considerable emphasis is placed on the measurement of performance criteria for estimating the relative difficulty of single-axis and two-axis tasks as well as for evaluation of the validity of mathematical models. It is shown that the modeling technique can be used to yield a quantitative indication of the degree of cross coupling between axes introduced by the operator. (Author) M.F.

A65-35475
A THEORY FOR OPTIMAL DETERMINISTIC CHARACTERIZATION OF TIME-VARYING HUMAN OPERATOR DYNAMICS.
Walter W. Wierwille (Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.).
(Institute of Electrical and Electronics Engineers, International Convention, New York, N.Y., Mar. 22-26, 1965, Paper.)
IEEE Transactions on Human Factors in Electronics, vol. HFE-6, Sept. 1965, p. 53-61. 16 refs.
Contract No. NAS1-3485.

Deterministic theory of characterization which can be used to determine the time-varying dynamics of the human operator engaged in a tracking task. With this theory it is possible to obtain a time-varying impulse response function and a time-varying transfer function which represent the action of a human operator in an open- or closed-loop control system. No special form of input is required. The characterization, that may be in either real-time or nonreal-time, is based upon an exact theory of fixed-form optimization. A strongly convergent, definitely stable iteration technique can be used to realize the optimal characterization filter. The theory takes

the time variation of the impulse response or transfer function into account, so that it is unnecessary to make the assumption of slowly varying dynamics. An uncertainty or compromise exists between the error - i.e., the error between the output of the human operator and that of the optimal characterizing filter, and the degree of variability of the optimal characterizing filter. This uncertainty is fundamental, and therefore cannot be circumvented. Although the theory has been verified by extensive experimental study, emphasis here is placed upon presentation of the theory. (Author) M. F.

A65-35476

THE EFFECTS OF PERFORMANCE-SCORING CRITERIA ON COMPENSATORY TRACKING BEHAVIOR.

Duncan C. Miller (Bolt Beranek and Newman, Inc., Cambridge, Mass.).

IEEE Transactions on Human Factors in Electronics, vol. HFE-6, Sept. 1965, p. 62-65.
Contract No. AF 33(657)-10124.

Description of a compensatory tracking experiment in which a subject received continuous feedback of his performance as measured by a scoring criterion. Several such criteria were investigated, each consisting of a weighted sum of mean-squared error and mean-squared stick movement. The subject changed his tracking behavior to suit the scoring criterion. These changes were manifested primarily as changes in the gain of the subject's describing function. It appears that a well trained subject is good at optimizing his behavior to suit a scoring criterion, and that the design and feedback of such scoring criteria should receive greater consideration in tracking experiments. (Author) M. F.

A65-35477

A SAMPLED-DATA PURSUIT TRACKING MODEL.

John G. Kreifeldt (Case Institute of Technology, Engineering Design Center, Cleveland, Ohio).

IEEE Transactions on Human Factors in Electronics, vol. HFE-6, Sept. 1965, p. 65-73. 6 refs.
Grant No. NsG 107-61.

Description of the development and testing of a sampled-data pursuit hand-tracking model for the human operator. The model embodies the simplest a priori assumptions about human tracking behavior. The analytical model is presented along with the experimentally determined frequency transfer characteristics of an analog computer built to have the same transfer function as the mathematical model. Generally good agreement was obtained in matching the model's frequency- and time-domain responses to those of a well trained human tracking in pursuit fashion an input power spectrum flat to 0.64 cps. (Author) M. F.

A65-35478 #

HUMAN USE OF SHORT-TERM MEMORY IN PROCESSING INFORMATION ON A CONSOLE.

B. P. Zeigler (National Research Council, Ottawa, Canada) and T. B. Sheridan (Massachusetts Institute of Technology, Dept. of Mechanical Engineering, Cambridge, Mass.).

IEEE Transactions on Human Factors in Electronics, vol. HFE-6, Sept. 1965, p. 74-83. 13 refs.
Contract No. AF 19(628)-3317.

Study of the role of a human operator performing an information-processing task at a console. Specifically explored are (1) the role of the console as a form of memory and (2) the ways in which this memory interacts with the human memory during a simple list-processing task. Times for various phases of the task are measured under four experimental conditions which systematically constrain the use of human or console memory. Three conceptual models are proposed: two characterize the structure of, and retrieval from, human and/or console memory when these are freely used together; the third characterizes the use of human memory when visual search of the console memory is very limited.
(Author) M. F.

A65-35479

A PROPOSED BEHAVIORAL TEST FOR DISTINGUISHING BETWEEN THE PERCEPTUAL JUDGMENT MECHANISMS OF HUMANS AND THOSE OF A MACHINE.

J. R. Ullman and C. R. Evans (National Physical Laboratory, Teddington, Middx., England).

IEEE Transactions on Human Factors in Electronics, vol. HFE-6, Sept. 1965, p. 86-91.

Discussion of a behavioral test which, if passed by human subjects and failed by a machine, would indicate something more than a quantitative difference in logical design between the brain and a character-recognition machine. The card sets used in the test are shown. A different meaningless figure was drawn on each of three cards. Human subjects and machines were shown the three cards and were required to judge whether the figure on one card was more similar to the figure on one or the other of the two remaining cards. The test hypothesis was that human subjects would, on the average, be consistently nonrandom in their similarity judgments on an infinite number of such card sets, whereas the judgments of any existing machine would turn out to be random in the same test. The results support the hypothesis. M. M.

A65-35480

VISUAL CAPABILITIES IN THE SPACE ENVIRONMENT.

Research sponsored by the Human Factors Society.
Edited by C. A. Baker (Honeywell, Inc., Minneapolis, Minn.).
Oxford, Pergamon Press, Ltd., 1965. 203 p.
$10.50.

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A65-35481
UTILIZING THE VISUAL ENVIRONMENT IN SPACE.
Aaron Hyman (USAF, Systems Command, Aerospace Medical Div., Behavioral Sciences Laboratory, Wright-Patterson AFB, Ohio).
(Human Factors, vol. 5, June 1963, p. 175-186.)
IN: VISUAL CAPABILITIES IN THE SPACE ENVIRONMENT.
Research sponsored by the Human Factors Society.
Edited by C. A. Baker.
Oxford, Pergamon Press, Ltd., 1965, p. 1-12. 8 refs.
[For abstract see Accession no. A64-10624 02-14]

A65-35482
VISUAL EXPERIENCES OF THE ASTRONAUTS AND COSMONAUTS.
Donald L. Zink (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Behavioral Sciences Laboratories, Wright-Patterson AFB, Ohio).
(Human Factors, vol. 5, June 1963, p. 187-201.)
IN: VISUAL CAPABILITIES IN THE SPACE ENVIRONMENT.
Research sponsored by the Human Factors Society.
Edited by C. A. Baker.
Oxford, Pergamon Press, Ltd., 1965, p. 13-27. 22 refs.
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A65-35483
VISUAL SEARCH IN THE SPACE ENVIRONMENT.
Walter F. Grether (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Behavioral Sciences Laboratory, Wright-Patterson AFB, Ohio).
(Human Factors, vol. 5, June 1963, p. 203-209.)
IN: VISUAL CAPABILITIES IN THE SPACE ENVIRONMENT.
Research sponsored by the Human Factors Society.
Edited by C. A. Baker.
Oxford, Pergamon Press, Ltd., 1965, p. 29-35. 10 refs.
[For abstract see Accession no. A64-10626 02-14]

A65-35484
VIGILANCE - A REVIEW AND RE-EVALUATION.
Harry J. Jerison and Ronald M. Pickett (Antioch College, Behavior Research Laboratory, Yellow Springs, Ohio).
(Human Factors, vol. 5, June 1963, p. 211-238.)
IN: VISUAL CAPABILITIES IN THE SPACE ENVIRONMENT.
Research sponsored by the Human Factors Society.
Edited by C. A. Baker.
Oxford, Pergamon Press, Ltd., 1965, p. 37-64. 75 refs.
Contract No. AF 33(657)-7362; Grant No. AF AFOSR 150-63.
[For abstract see Accession no. A64-10627 02-14]

A65-35485
VISION AND UNUSUAL GRAVITATIONAL FORCES.
William J. White and Richard A. Monty (Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.).
(Human Factors, vol. 5, June 1963, p. 239-263.)
IN: VISUAL CAPABILITIES IN THE SPACE ENVIRONMENT.
Research sponsored by the Human Factors Society.
Edited by C. A. Baker.
Oxford, Pergamon Press, Ltd., 1965, p. 65-89. 115 refs.
[For abstract see Accession no. A64-10628 02-14]

A65-35486
VISUAL SPACE PERCEPTION AS INFLUENCED BY UNUSUAL VESTIBULAR STIMULATION.
Brant Clark (San José State College, Dept. of Psychology, San José, Calif.).
(Human Factors, vol. 5, June 1963, p. 265-274.)
IN: VISUAL CAPABILITIES IN THE SPACE ENVIRONMENT.
Research sponsored by the Human Factors Society.
Edited by C. A. Baker.
Oxford, Pergamon Press, Ltd., 1965, p. 91-100. 57 refs.
[For abstract see Accession no. A64-10629 02-14]

A65-35487
THE VISUAL SUB-SYSTEM CONCEPT AND SPACECRAFT ILLUMINATION.
Albert H. Urmer and Edward R. Jones (McDonnell Aircraft Corp., Engineering Psychology Dept., St. Louis, Mo.).
(Human Factors, vol. 5, June 1963, p. 275-283.)
IN: VISUAL CAPABILITIES IN THE SPACE ENVIRONMENT.
Research sponsored by the Human Factors Society.
Edited by C. A. Baker.

A65-35488
SPACE CABIN ATMOSPHERE TRACE CONTAMINANTS AND THEIR POSSIBLE INFLUENCE ON VISUAL PARAMETERS.
John M. Lagerwerff (Marquardt Corp., Bioastronautics Dept., Van Nuys, Calif.).
(Human Factors, vol. 4, June 1963, p. 285-293.)
IN: VISUAL CAPABILITIES IN THE SPACE ENVIRONMENT.
Research sponsored by the Human Factors Society.
Edited by C. A. Baker.
Oxford, Pergamon Press, Ltd., 1965, p. 111-119. 68 refs.
[For abstract see Accession no. A64-10631 02-14]

A65-35489
VISUAL SURVEILLANCE AND RECONNAISSANCE FROM SPACE VEHICLES.
Marshall A. Narva and Frederick A. Muckler (Martin Marietta Corp., Martin Co., Baltimore, Md.).
(Human Factors, vol. 5, June 1963, p. 295-315.)
IN: VISUAL CAPABILITIES IN THE SPACE ENVIRONMENT.
Research sponsored by the Human Factors Society.
Edited by C. A. Baker.
Oxford, Pergamon Press, Ltd., 1965, p. 121-141. 54 refs.
[For abstract see Accession no. A64-10632 02-14]

A65-35491
VISUAL CAPABILITIES OF PERFORMING RENDEZVOUS IN SPACE.
James M. Vanderplas (Washington University, St. Louis, Mo.).
(Human Factors, vol. 5, June 1963, p. 323-328.)
IN: VISUAL CAPABILITIES IN THE SPACE ENVIRONMENT.
Research sponsored by the Human Factors Society.
Edited by C. A. Baker.
Oxford, Pergamon Press, Ltd., 1965, p. 149-154. 23 refs.
[For abstract see Accession no. A64-10634 02-14]

A65-35493
SIMULATION OF A STAR FIELD.
Robert G. Kinkade, Harry L. Snyder, and Charles P. Greening (North American Aviation, Inc., Autonetics Div., Anaheim, Calif.).
(Human Factors, vol. 5, June 1963, p. 335-338.)
IN: VISUAL CAPABILITIES IN THE SPACE ENVIRONMENT.
Research sponsored by the Human Factors Society.
Edited by C. A. Baker.
Oxford, Pergamon Press, Ltd., 1965, p. 161-164.
[For abstract see Accession no. A65-10636 02-10]

A65-35494
VISUAL REQUIREMENTS FOR LANDING ON THE MOON.
Jack E. Conklin (Hughes Aircraft Co., Culver City, Calif.).
(Human Factors, vol. 4, Dec. 1962, p. 335-342.)
IN: VISUAL CAPABILITIES IN THE SPACE ENVIRONMENT.
Research sponsored by the Human Factors Society.
Edited by C. A. Baker.
Oxford, Pergamon Press, Ltd., 1965, p. 165-172. 26 refs.
[For abstract see Accession no. A63-13880 09-14]

A65-35495
VISUAL EXPERIMENTS FOR EXTENDED MANNED SPACE FLIGHT.
William J. White (Douglas Aircraft Co., Inc., Advanced Biotechnology Dept., Santa Monica, Calif.).
IN: VISUAL CAPABILITIES IN THE SPACE ENVIRONMENT.
Research sponsored by the Human Factors Society.
Edited by C. A. Baker.
Oxford, Pergamon Press, Ltd., 1965, p. 173-181. 12 refs.

Review of the objectives and concepts on which a progressive program of visual experiments for orbital research laboratories can be constructed, and a discussion of some special problems to be investigated and of the apparatus required. The Gemini schedule of tests and observations for the evaluation of human vision is presented. Experimentation can be planned around two goals - (1) a solution for some of the specific visual problems of space operation, and (2) a contribution to the development of a general theory of human productivity in space systems. The experimental proce-Apollo programs for testing the visual definition of both remote and nearby objects in space, the visual definition of terrestrial features, and astronaut visibility are described. D. P. F.

A65-35496
VIBRATION AND VISION.
Fred W. Snyder (Boeing Co., Wichita, Kan.).
IN: VISUAL CAPABILITIES IN THE SPACE ENVIRONMENT.
Research sponsored by the Human Factors Society.
Edited by C. A. Baker.
Oxford, Pergamon Press, Ltd., 1965, p. 183-201. 36 refs.
Contract No. Nonr-2994(00).

Analysis of the vibration environment in space flight and how it affects human visual capabilities. Data and estimates are presented to indicate the probable nature of the vibration environment in a space capsule. A review is made of studies which indicate that visual decrements of varying kinds and degrees occur under vibration bearing resemblance to the vibration that may be present in the astronaut's physical environment. The present knowledge of visual capability under low-frequency vibration is discussed in relation to both basic and applied uses of this information; some of the research problems incurred are also considered. Research that is required for a fuller understanding of visual capability under low-frequency vibration is suggested. (Author) D. P. F.

A65-35587
RESPONSE OF THE PUPIL TO STEADY-STATE RETINAL ILLUMINATION - CONTRIBUTION BY CONES.
Jurriaan ten Doesschate (Utrecht, University, Utrecht, Netherlands) and Mathew Alpern (Michigan, University, Ann Arbor, Mich.).
Science, vol. 149, Aug. 27, 1965, p. 989-991.
National Institutes of Health Grant No. NB 01578-07.

Measurement of the response of the pupil to steady-state retinal illumination in an observer who lacked functioning rods. At high intensities, this response was as great as that of a normal eye. It is considered that these results cannot be explained by the hypothesis that only rods are receptors for the steady-state response.
F.R.L.

A65-35588
INTEROCULAR TRANSFER IN GOLDFISH - COLOR EASIER THAN PATTERN.
David J. Ingle (Massachusetts Institute of Technology, Dept. of Psychology, Cambridge, Mass.).
Science, vol. 149, Aug. 27, 1965, p. 1000-1002. 11 refs.
Grant No. NsG-496.

Monocular discrimination by trained goldfish of different patterns that also differed in color. When tested with reversed combinations of color and pattern cues, the fish responded on the basis of pattern while using the trained eye but on the basis of color while using the untrained eye. Interhemispheric transfer of color information was therefore considered to be more effective than that of pattern. (Author) F.R.L.

A65-35637 #
TETHER-LINE RETRIEVAL OF ASTRONAUTS UNDER EMERGENCY CONDITIONS.
E. Parsons, Jr. and P. M. Kenner (Ling-Temco-Vought, Inc., Dallas, Tex.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, SYMPOSIUM ON STRUCTURAL DYNAMICS AND AEROELASTICITY, BOSTON, MASS., AUGUST 30-SEPTEMBER 1, 1965, TECHNICAL PAPERS. [A65-35608 23-32]
New York, American Institute of Aeronautics and Astronautics, 1965, p. 284-290.

Method for retrieving an astronaut who is floating away from his spacecraft. He cannot be reeled in directly, for this would cause him to spin too fast and would place great tension on the retrieval line. It is proposed that an anchor mass be deployed on a line from the astronaut to receive and store his momentum while he is being retrieved. The equations of motion used in this problem, and the digital computer program developed specifically for its solution, are described. R.A.F.

A65-35816 #
EFFECTS OF SPACE FLIGHT FACTORS ON THE PHYSIOLOGICAL PROCESSES OF GERMINATION IN SOME HIGHER PLANTS [VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FIZIOLOGICHESKIE PROTSESSY PRI PRORASTANII SEMIAN NEKOTORYKH VYSSHIKH RASTENII].
L. K. Gordon, T. S. Kanter, V. V. Antipov, and V. G. Vysotskii.
Kosmicheskie Issledovaniia, vol. 3, May-June 1965, p. 473-479.
In Russian.

Discussion of the effects of space flight on the meristematic tissues of carrot, mustard, tomato, onion, and cucumber seeds, and wheat grains carried by the Vostok 5 and 6 spaceships. Observations of the germination process and a chemical analysis of wheat grains are conducted after the flights. Stimulated activity of polyphenoloxidase and cytochrome-oxidase is revealed. V. Z.

A65-35817 #
EFFECT OF SPACE FLIGHT EXPOSURE IN THE VOSTOK 5 AND 6 SPACESHIPS ON PRIMARY ROOT CHROMOSOMES OF THE EMBRYOS IN SEEDS OF SOME HIGHER PLANTS [VLIIANIE USLOVII KOSMICHESKOGO POLETA NA KORABLIAKH-SPUTNIKAKH "VOSTOK-5" I "VOSTOK-6" NA KHROMOSOMY PERVICHNYKH KORESHKOV ZARODYSHEI V SEMENAKH NEKOTORYKH VYSSHIKH RASTENII].
N. L. Delone, N. A. Rudneva, and V. V. Antipov.
Kosmicheskie Issledovaniia, vol. 3, May-June 1965, p. 480-487.
19 refs. In Russian.

Study of Vostok 5 and 6 space flight exposure effects on the variation in number of cells with chromosome alterations in embryonic roots of Daucus corota, Licopersicum esculentum, Pinus silvestris, Vicia faba, Cucumus sativus, Triticum vulgare, Lactuca sativa, and Sinapis arvensis. Changes in cytological patterns revealed in seeds after the flight, notably stimulated chromosome alterations in Daycus corota and Licopersicum esculentum, are discussed. V. Z.

A65-35818 #
STUDY OF THE PHAGOPRODUCTION OF E. COLI K-12(λ) INDUCED DURING VOSTOK 3 AND 4 SPACE FLIGHTS [IZUCHENIE FAGOPRODUKTSII E. COLI K-12(λ), INDUTSIROVANNOI V USLOVIIAKH POLETOV KOSMICHESKIKH KORABLEI "VOSTOK-3" I "VOSTOK-4"].
N. N. Zhukov-Verezhnikov, I. N. Maiskii, A. P. Pekhov, N. I. Rybakov, G. P. Tribulev, P. P. Saksonov, B. A. Mishchenko, V. V. Antipov, V. A. Kozlov, K. D. Rybakova, V. G. Vysotskii, N. N. Dobrov, V. V. Pantiukhova, and E. D. Aniskin.
Kosmicheskie Issledovaniia, vol. 3, May-June 1965, p. 487-491. 12 refs. In Russian.

Results of a study of the effect of exposure to radiation during Vostok 3 and 4 space flights on the phagoproduction of 5-hr E. coli K-12 (λ) suspensions, measuring the induced phagoproduction 28, 72, 96, and 120 hr after the landing. The procedure of coli culture preparation and analysis is described. A statistically evidenced increase by a factor of 1.86 to 2.0 in the number of phagoproducing cells induced by space flight exposure is established, leveling off in 48 to 72 hr to the amount of spontaneous phagoproduction. V. Z.

A65-35819 #
INVESTIGATION OF THE BIOLOGICAL EFFECT OF SPACE FLIGHT FACTORS BY LYSOGENIC BACTERIA EXPERIMENTS ON THE VOSTOK 5 AND 6 SPACESHIPS [ISSLEDOVANIE BIOLOGICHESKOGO DEISTVIIA FAKTOROV KOSMICHESKOGO POLETA S POMOSHCH'IU LIZOGENNYKH BAKTERII V EKSPERIMENTAKH NA KORABLIAKH "VOSTOK-5" I "VOSTOK-6"].
N. N. Zhukov-Verezhnikov, I. N. Maiskii, A. P. Pekhov, V. V. Antipov, N. I. Rybakov, and V. A. Kozlov.
Kosmicheskie Issledovaniia, vol. 3, May-June 1965, p. 492-494. 7 refs. In Russian.

Results of a study of the biological effect of Vostok 5 and 6 space-flight exposures measured by statistically verified values of the ratio between induced and spontaneous phagoproduction in exposed E. coli K-12 (λ) samples. It is found that 0.05% additions of β-mercapto propylamine are an effective protective agent exerting a blocking effect on the genetics of formation of an induced phage. The results are compared with those of previous biological experiments on space-flight exposure. V. Z.

A65-36001
DISEASE TRANSMISSION BY AIRCRAFT.
Frederick R. Ritzinger (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Aeromedical Indoctrination Branch, Brooks AFB, Tex.).
(Joint Committee on Aviation Pathology, Scientific Session, 5th, Washington, D.C., Oct. 12-14, 1964, Paper.)
Military Medicine, vol. 130, July 1965, p. 643-647. 16 refs.

Study of the dissemination of diseases between countries by air travel. Although transmission of food-borne and water-borne diseases via air travel is possible, actual instances of such spread are rarely reported. The dissemination of disease by contaminated materials carried on aircraft is becoming an increasing risk because of the proportion of the world's commerce being carried out by means of aircraft. The transportation of infected rodents increased the risk of spreading such diseases as plague, salmonellosis, and leptospirosis through rodent infestation. Accidental transportation of infected arthropod vectors aboard aircraft may serve to introduce new pathogens across international borders. A further possibility is that new arthropod vectors of disease may be introduced and become implanted in a country or area. Disease transmission by aircraft has, in the greatest number of cases, involved infected persons; malaria, for example, can be spread from one country to another by aircraft and could hamper the world-wide malaria eradication program. Airline operators with international routes have a great responsibility for maintaining precautionary measures in all aspects of public health and must provide competent medical and sanitary supervision of their personnel and route facilities. M.F.

A65-36002
IDENTIFICATION IN AVIATION PATHOLOGY.
P. J. Stevens (Royal Air Force, Institute of Pathology and Tropical Medicine, Aviation Pathology Dept., Halton, Bucks., England).
(Joint Committee on Aviation Pathology, Scientific Session, 5th, Washington, D.C., Oct. 12-14, 1964, Paper.)
Military Medicine, vol. 130, July 1965, p. 653-661. 8 refs.

Problems of the identification of the victims of fatal aircraft accidents. Visual identification is a highly satisfactory means of identification if it can be reasonably viewed by a relative or a lay acquaintance of the deceased. However, the circumstances of aircraft accidents are such that few cases fall into this category; most bodies are smashed or burnt beyond recognition. The value of clothing and documents remaining on the bodies is obvious. Clothing helps if the garments worn are sufficiently distinctive. Medical identification is useful when the foregoing means of identification cannot be applied to a body. Dental identification is usually effected by comparing findings in the cadaver with information on the dental state of the passengers. X rays other than dental X rays have been reported of use in identification after aircraft accidents. If none of the means discussed will adequately identify the bodies, it is reasonable to attempt identification by exclusion. M.F.

A65-36003
THE AIR CRASH MEDICAL INVESTIGATION TEAM.
J. Gordon Webster (USAF, Hospital Andrews, Laboratory Service, Andrews AFB, Washington, D.C.), Warren W. Kopp (USAF, Hospital Andrews, Immunohematology Section, Andrews AFB, Washington, D.C.), and Lawrence G. Kistler (USAF, Hospital Andrews, Medical Illustration Section, Andrews AFB, Washington, D.C.).
(Joint Committee on Aviation Pathology, Scientific Session, 5th, Washington, D.C., Oct. 12-14, 1964, Paper.)
Military Medicine, vol. 130, July 1965, p. 683-686.

Study of the problem of conducting a thorough medical investigation of the human factors involved in an aircraft accident. It has long been recognized that the most consistently valuable information on accident reconstruction would be obtained by well trained, motivated pathologists, adequately assisted by trained supporting individuals working at the site. The Air Crash Medical Investigation Team, consisting of a pathologist, clinical laboratory officer, and medical photographer, has been established to provide the maximum amount of reconstructive data to the appointed accident investigative board at the site of the aircraft accident. The responsibilities of the Clinical Laboratory Officer fall into three categories - administrative, technical, and liaison. The pathologist, laboratory officer, and medical photographer engage in frequent periods of training in nature from study of ejection seats, parachutes, and personal flying equipment to elements of flight physiology, oxygen equipment, and altitude chamber runs. It is suggested that such a medical team, working in close cooperation with nonmedical investigative agencies and regarding each air crash as an individual research project, might well determine the cause of more fatal aircraft accidents, 14% of which currently remain unexplained. M.F.

A65-36047
BIOINSTRUMENTATION DEVELOPMENT AT THE AIR FORCE FLIGHT TEST CENTER, EDWARDS AIR FORCE BASE, CALIFORNIA 1960-1963.
Harry R. Bratt (USAF, Systems Command, Flight Test Center, Edwards AFB, Calif.).
IN: FLIGHT TEST INSTRUMENTATION; PROCEEDINGS OF THE THIRD INTERNATIONAL SYMPOSIUM, CRANFIELD, BEDS., ENGLAND, APRIL 13-16, 1964. VOLUME 3. [A65-36034 24-14]
Symposium sponsored by the Department of Flight of the College of Aeronautics.
Edited by M. A. Perry.
Oxford, Pergamon Press, Ltd., 1965, p. 249-265.

Review of the development of bioinstrumentation for monitoring physiological data in high-performance aircraft. The bioinstrumentation for the X-15 program at the Air Force Test Center at Edwards AFB, Calif., is discussed. Equipment used in the early phases of the program to determine ECG, blood pressure, skin temperature, oxygen mass flow, and pulse wave velocity is described. The

subsequent development of a miniaturized, 12-channel multiplexed FM/FM self-contained biotelemetry system for these measurements is discussed. The system used for the real-time monitoring of the telemetered data is reviewed. P.K.

A65-36091
DIFFRACTION AND VISUAL ACUITY OF INSECTS.
John Palka (California, University, Dept. of Zoology, Los Angeles, Calif.).
Science, vol. 149, July 30, 1965, p. 551-553. 12 refs.
Research supported by the National Institutes of Health, NSF and Navy.

Review of Burtt and Catton's suggestion that insects can resolve striped patterns finer than the theoretical limit set by the small diameter (30μ) of the ommatidial lenslets. Events at the edges of the window behind which the patterns are moved explain these experiments without transgressing diffraction limitations. This interpretation leads to successful quantitative predictions of the effects of changing the boundary conditions. (Author) M.F.

A65-36092
VISUAL RESOLUTION AND THE DIFFRACTION LIMIT.
H. B. Barlow (California, University, School of Optometry, Neurosensory Laboratory, Berkeley, Calif.).
Science, vol. 149, July 30, 1965, p. 553-555. 10 refs.

Observation that the movement of a grating behind a fixed aperture can be detected by human subjects when the grating is well below the diffraction limit of the pupil and below acuity measured with stationary gratings. With movement one sees a flicker or ripple at the edges, and it is argued that these edge effects lead to spurious estimates of optical resolution in insects and man. (Author) M.F.

A65-36099
ATTENUATION OF AVERSIVE PROPERTIES OF PERIPHERAL SHOCK BY HYPOTHALAMIC STIMULATION.
Verne C. Cox and Elliot S. Valenstein (Fels Research Institute, Yellow Springs, Ohio).
Science, vol. 149, July 16, 1965, p. 323-325. 17 refs.
National Institutes of Health Grant No. M-4529; Grant No. NsG-437.

Investigation of the alleviation of pain with positive brain stimulation. Rats in a two-compartment testing chamber sought out hypothalamic stimulation and escaped from aversive foot shock delivered through a grid-scrambling device. Animals also sought out paired hypothalamic stimulation and foot shock. Control experiments demonstrating that animals did not discriminate between hypothalamic stimulation and paired hypothalamic stimulation and foot shock supported the view that hypothalamic stimulation attenuates the aversive properties of foot shock. R.A.F.

A65-36154
DETERMINATION OF THE ACHROMATIC AXIS OF THE EYE BY AN EXPERIMENTAL METHOD [DETERMINATION DE L'AXE ACHROMATIQUE DE L'OEIL PAR UNE METHODE EXPERIMENTALE].
Romuald Jóźwicki (Institut d'Optique Théorique et Appliquée, Paris, France).
Académie des Sciences (Paris), Comptes Rendus, vol. 261, no. 5, Aug. 2, 1965, p. 1403, 1404. In French.

Method for the experimental determination of the achromatic axis of the eye with respect to the center of the pupil. The subject looks through a viewer with a 0.25-mm orifice at a wire with an angular thickness of 3', which is illuminated by a high-pressure Hg arc lamp. The light from the latter first passes through an achromatic condensor and a system of filters for separating the lamp spectrum into a red and a blue component. The subject sees a red background in the center of which there is the blue filter, which is normal to the axis of the wire. The subject's pupil may be observed by means of a mirror and a semitransparent screen. The subject fixes his eye on the position where the wire as seen through the blue filter coincides with the wire seen through the red filter. A photograph of the position of the subject's pupil at this instant, in relation to the hole in the visor, will indicate the position of the achromatic axis. The observations on three emmetropic subjects are recorded, and it is shown that the axis is displaced toward the nose. D.P.F.

A65-36232 #
PROBLEMS OF DIAGNOSTIC INFORMATION COLLECTION IN SPACE FLIGHT AS ONE OF THE MEDICAL CYBERNETICS TRENDS.
V. V. Parin and R. M. Baĭevsky.
International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper. 13 p.

Consideration of some new concepts of diagnostic information collection in space flight which arise from recent achievements in radioelectronics, biotelemetry, energetics, etc. Taking the concept of the physiological measuring-information system as a basis, the improvement of the diagnostic information collection system applying to prolonged space flight, the use of an on-board computer, and the composition of data-handling algorithms are examined consecutively. Improvement of physiological information collection is connected with the solution of such tasks as collection of maximum data using minimum equipment, transmission of maximum data through limited telemetering channels, and reduction of data handling time. Some results observed in recent manned space flights are discussed. F.R.L.

A65-36236 #
SOME THEORETICAL ASPECTS OF THE CONSTRUCTION OF ARTIFICIAL ECOLOGICAL SYSTEMS.
A. Rubin and A. Foht (Moscow State University, Moscow, USSR).
International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper. 9 p.

Discussion of approaches to the evaluation of the efficiency and stability of a complex ecological system from thermodynamic and kinetic viewpoints. For the sake of simplification, the artificial ecological complex is represented as a closed system composed of separately connected components operating at the expense of solar radiation. It is noted that such theoretical approaches can be useful in finding the most favorable conditions for coupling autotrophic and heterotrophic links with respect to energy efficiency. It is pointed out that the preliminary construction of mathematical models of energy processes permits the investigation of the internal dynamic properties in such complex systems. The role of feedback in the stabilization of energy transfer is of great interest in this respect. Mathematical analysis proves that complex systems with several components and feedbacks, described by nonlinear differential equations, are characterized by a wide range of values which can be
A classification of information elements based on this principle is proposed. V.Z.

A65-36366 #
PHONATORY PROCESSES DURING THE COURSE OF OVERPRESSURE RESPIRATION [MECANIQUE PHONATOIRE AU COURS DE LA RESPIRATION EN SURPRESSION].
C. Jacquemin, P. Varene, J. Demange, and J. Timbal (Centre d'Essais en Vol, Laboratoire de Médecine Aéro-Spatiale, Brétigny-sur-Orge, Seine-et-Oise, France).
International Congress on Aeronautic and Space Medicine, 13th, Dublin, Ireland, Sept. 14-18, 1964, Paper. 6 p. 9 refs. In French.

Investigation of the modifications and difficulties in speech encountered by subjects breathing through respiratory devices operated at overpressures to counteract high-altitude hypoxia. To test the effects of such devices the electrical activity of the diaphragm was studied using Petit's method. Two persons were subjected to a respiratory overpressure of 30 mb using the "body box" method, and while this was in progress their most important respiratory muscles involved in exhaling (the abdomen and the diaphragm) were electromyographically examined. Both subjects had been trained in breathing when using the overpressure device but had had no

speech training. The intrathoracic and abdominal pressures were also simultaneously recorded. A microphone was used to test speech. The experiments indicated that speech coordination is impaired but may be restored through adequate training and experience.

D. P. F.

A65-36398 #

LIMITS TO THE CORRECTION BY HYPERCAPNIA OF CERTAIN EFFECTS OF HYPOXIA [CORRECTION PAR L'HYPERCAPNIE DE CERTAINS EFFETS DE L'HYPOXIE. SES LIMITES].

M.-V. Strumza (Paris, Université, Laboratoire de Biologie Aéronautique, Paris, France).

International Congress on Aeronautic and Space Medicine, 13th, Dublin, Ireland, Sept. 14-18, 1964, Paper. 10 p. In French.
Research supported by the Direction des Recherches et Moyens d'Essais.

Extension of previous work on correcting certain effects of hypoxia by adding CO_2 to the breathing supply. The previous work showed that disturbing effects of hypoxia on intellectual efficiency and on energy expenditure during work could be counteracted by inducing hypercapnia. The amounts of CO_2 which need be added to the breathing supply are examined more precisely in tests conducted on 114 subjects. It is found that, for moderate hypoxia at an O_2 partial pressure of 110 mm Hg, the addition of CO_2 at a partial pressure of 15 mm Hg will eliminate most of the disturbing effects to intellectual and muscular activity. For hypoxia at an O_2 partial pressure of 100 mm Hg, however, CO_2 at 15 mm Hg causes many unpleasant and undesirable effects, including dyspnoea. The optimum CO_2 partial pressure for this degree of hypoxia is 9 mm Hg.

P. K.

A65-36399 #

MEASUREMENT OF ADJUSTMENT TO ANOXEMIA [ADAPTOMETRIE ET ANOXEMIE].

G. Perdriel, P. Manent, and A. Bertrand (Aéronautique de Paris, Centre Principal d'Expertise Médicale du Personnel Navigant, Paris, France).

International Congress on Aeronautic and Space Medicine, 13th, Dublin, Ireland, Sept. 14-18, 1964, Paper. 6 p. In French.

Study of the effects of increased altitude (decreased oxygen intake) on the night-time visual capabilities of pilots. Tests on the scotopic sensitivity to low-level illumination during conditions of anoxemia are reviewed, and measurements on the scotopic threshold at different simulated altitudes are discussed. It is concluded that variations in the nocturnal visual capability of aviators as altitude increases are caused not by a functional alteration in the retina, but by a disturbance in the integration of luminous sensations by the cortex or the subcortical centers. This conclusion is supported by the observation that electroretinograms, and particularly their scotopic components, remain unchanged by anoxemia. In addition, the impairment of visual capability under these conditions can be corrected in less than two minutes by the inhalation of oxygen, a duration more in accord with restoration of cortical function than with the restoration of activity to the retinal purple.

P. K.

A65-36822

DYNAMIC TESTING OF AIRCRAFT OXYGEN SYSTEMS.

G. R. Allen, K. R. Maslen, and G. F. Rowlands (Ministry of Aviation, Royal Aircraft Establishment, Mechanical Engineering Dept., Human Engineering Div., Farnborough, Hants., England).

World Aerospace Systems, vol. 1, Sept. 1965, p. 434-436. 6 refs.

Analysis of the factors which must be considered in completely assessing the dynamic performance of a breathing system in terms of a model representing impedance, which is expressed in terms of pneumatic inductance, capacitance, and resistance. It is shown that the instability inherent in breathing systems must be made imperceptible to an aircrew in order to avoid adverse psychological effects. An analysis of a breathing system is made in which it is seen that it can be analogically represented by two servomechanisms, the regulator controlling the pressure at its outlet and the man controlling the flow he receives. An electrical analog is developed which represents both the system and the human impedances. In order to assess completely the dynamic performance of a system, it is necessary to test it with a machine capable of applying any required flow pattern, and which can also present any required impedance in the known human range.

D. P. F.

LC ENTRIES

A65-82174
INVESTIGATIONS OF BLINKING DURING ACTIVITIES WITH DIFFERENTIAL VISUAL CONTROL REQUIREMENTS AND AT DIFFERENT STAGE PRETRAINING [UNTERSUCHUNGEN ZUM LIDSCHLAGGESCHEHEN BEI TATIGKEITEN MIT UNTERSCHIEDLICHEN ANFORDERUNGEN AN DIE VISUELLE KONTROLLE UND BEI UNTERSCHIEDLICHER VORUBUNG].
Beate Creupner (Dresden, Tech. U., Inst. für Psychol., East Germany).
Zeitschrift für Psychologie, vol. 170, May 1965, p. 171–200. 24 refs. In German.

Involuntary blinking as a function of practice on visual-motor tasks was explored with three types of psychomotor tasks of graded complexity requiring different levels of visual control and guidance, concentration, and anticipation. The results point to an unconscious coordination of eye and hand. As the level of sensorimotor skill increases and more functions are assumed by tactile-kinesthetic senses, the blinking rate increases linearly. Anticipation plays a role as evident in the lack of increase in reflex blinking during practice of simple reaction time responses to acoustic and visual stimuli. Blinking occurs at such phases where it causes the least interference with visual guidance and control. Modification of the blinking frequency during repeated practice occurs without conscious participation. Blink reflex may, therefore, be employed as an index of the level of skill in sensorimotor tasks requiring a high degree of visual guidance and control, provided the task structure and requirements are fully recognized.

A65-82175
MEASURING EXPERIMENTS ON SIZE CONSTANCY IN VISUAL PERCEPTION [MESSENDE VERSUCHE UBER DIE GROSSENKONSTANZ BEI DER OPTISCHEN WAHRNEHMUNG].
W. Kirmse (Karl-Marx-U., Physiol. Inst., Leipzig, East Germany).
Zeitschrift für Psychologie, vol. 170, May 1965, p. 224–241. 19 refs. In German.

The role of convergence and accommodation in perceptual constancy was explored with 20 subjects. The subjects adjusted the first of two successive congruent triangles to the size of the second triangle at a constant distance from the eyes. The following results were obtained. Nearly ideal size constancy existed with binocular vision when the viewing distance of the comparison triangle ranged from 12.5 to 100 cm. Also in monocular viewing the distance effect on the retinal image size is proportionally compensated for but to a lesser extent than in binocular viewing. Pinhole viewing (binocular and monocular) which excludes accommodation resulted in a loss of perceptual constancy and the size judgments were strictly according to the retinal image size. Analysis of the results show size constancy as a linearly increasing function of accommodation. This relationship does not hold between size constancy and convergence in monocular viewing.

A65-82176
COMPETITIVE AND NONCOMPETITIVE PERFORMANCE IN RELATION TO ACHIEVEMENT MOTIVE AND MANIFEST ANXIETY.
E. Dean Ryan and W. L. Lakie (Calif. U., Davis).
Journal of Personality and Social Psychology, vol. 1, Apr. 1965, p. 342–345. 14 refs.

This study was concerned with competitive performance of subjects differing in n Ach (French Test of Insight) and manifest anxiety (Taylor Manifest Anxiety (MA) scale). Subjects performed initially on a perceptual motor task under noncompetitive or neutral conditions and then were tested on the same apparatus in a face-to-face competitive situation. When subjects were classified simultaneously on the MA scale and n Ach, the high MA scale-low n Ach group performed significantly better under noncompetitive conditions, while the low MA scale-high n Ach group made significantly greater gains during competition. When subjects were classified by scores on a single variable performance differences between groups were in the predicted direction, but only the change from the noncompetitive to the competitive situation was significant. It would appear that a knowledge of both motivational variables should enhance the possibility of predicting success in competitive situations.

A65-82177
THE TOXICITY OF NIOBIUM SALTS.
William L. Downs, James K. Scott, Charles L. Yuile, Frank S. Caruso, and C. K. Wong (Rochester U., School of Med. and Dentistry, Dept. of Radiation Biol., N. Y.)
(Am. Ind. Hyg. Assoc., 23rd Ann. Meeting, Washington, D. C., May 1962).
American Industrial Hygiene Association Journal, vol. 26, Jul.–Aug. 1965, p. 337–346. 15 refs.
AEC supported research.

The acute and subacute toxicity of potassium niobate and niobium pentachloride was investigated. Single intravenous doses of 20 mg. Nb/kg. or less to rats, rabbits, and dogs were not fatal. The LD_{50} (seven day) value for mice and rats given a single intraperitoneal injection of potassium niobate was 13 and 92 mg. Nb/kg., respectively. The oral LD_{50} (seven day) value for the rat was 725 mg. Nb/kg. Renal injury was observed in all species following parenteral injection at doses ranging from 20 to 50 mg. Nb/kg. Repeated intraperitoneal injections of niobium pentachloride or potassium niobate of 30 mg. Nb/kg. resulted in renal injury and death. Dietary levels as high as 1% of either compound were ingested by rats, for a seven-week period, without effect. The nephrotoxic action of niobium was not observed when the niobium salt was complexed with ascorbic acid prior to injection.

A65-82178
HISTOLOGICAL AND HISTOPHYSIOLOGICAL OBSERVATIONS ON THE SKELETAL MUSCLES OF COLD-EXPOSED RATS.
K. S. Scaria, N. T. Joseph, L. S. Premalatha, and K. Prema (Defence Inst. of Physiol. and Allied Sci., Madras, India).
Indian Journal of Experimental Biology, vol. 3, Apr. 1965, p. 112–117. 18 refs.

Histological and histophysiological changes occurring in the gastrocnemius, soleus and plantaria muscles of rats on exposure to cold stress are reported. A reduction is observed in the diameter of the muscle fibers of rats exposed to cold stress. This reduction in muscle fiber diameter is accompanied by an increase in the concentrations of myoglobin, succinic dehydrogenase and cytochrome oxidase, and enables the participation of more and more fibers in the oxidative activity of the muscles by transforming white fibers into red ones. Vascularization of the muscles is also increased as a result of cold stress.

A65-82179
CYTOLOGICAL ANALYSIS OF HIGH ENERGY PROTON ACTION. VI. COMPARATIVE CHARACTERISTICS OF THE INFLUENCE OF 660 MEV PROTONS AND Co^{60} GAMMA-RAYS ON HEMATOPOIESIS [TSITOLOGICHESKII ANALIZ DEISTVIIA PROTONOV VYSOKIKH ENERGII. VI. SRAVNITEL'NAIA KHARAKTERISTIKA DEISTVIIA PROTONOV 660 MEV I GAMMA-LUCHEI Co^{60} NA KROVOTVORENIE].
V. L. Ponomareva (USSR, Acad. of Med. Sci., Inst. of Hyg. Labor and Prof. Diseases, Moscow).
Radiobiologiia, vol. 5, 1965, p. 514–518. 5 refs. In Russian.

Morphological study of the peripheral blood and of the hematopoietic organs of rats exposed either to 660 Mev protons or to a 500 r dose of Co^{50} gamma rays did not reveal any difference in the effect of the two sources of radiation. Yet the biological damage of the hematopoietic system was more pronounced after gamma irradiation, and the regenerative process more delayed, than after exposure to high-energy protons.

A65-82180
DEAMINATION OF ADENINE IN DNA IN SEEDS UNDER THE INFLUENCE OF FAST NEUTRONS [DEZAMINIROVANIE ADENINA V DNK SEMIAN POD VLIIANIEM BYSTRYKH NEITRONOV].
V. I. Tokarskaia (USSR, Acad. of Sci., Inst. of Biol. Phys., Moscow).
Radiobiologiia, vol. 5, 1965, p. 562–570. 25 refs. In Russian.

Irradiation of dry pea seeds, either with gamma rays or a 10 kr dose of fast neutrons, caused little damage to DNA. Hydration of the irradiated seeds during a 24 hr. period at room temperature produced different effects according to the source of radiation; the seed exposed to neutrons suffered changes in the nitrogenous bases, different from the changes following gamma radiation. After gamma radiation the number of pyrimidine bases, particularly thiamine, was decreased. After neutron radiation there was a decrease in adenine, with simultaneous appearance of hypoxanthine. The results indicate that after neutron irradiation the damage to the nitrogenous bases, such as deamination of ademine, takes place at certain loci, leading to substitution of different bases during the DNA molecule synthesis. The substitution leads to changes in the DNA specificity and to loss of cell viability.

A65-82181
EFFECT OF MAGNESIUM SULFATE ON ELIMINATION OF Sr^{90} FROM THE ORGANISM OF SOME LABORATORY ANIMALS [VLIIANIE SUL'FATA MAGNIIA NA UDALENIE STRONTSIIA-90 IZ ORGANIZMA NEKOTORYKH LABORATORNYKH ZHIVOTNYKH].
B. N. Annenkov.
Radiobiologiia, vol. 5, 1965, p. 620–621. In Russian.

Experiments were conducted on white rats, rabbits and dogs in order to study the interfering effect of magnesium sulfate in the mechanism of absorption of Sr^{90} in the skeletal tissue of an organism. Subcutaneous injections of 300 mg./kg. of body weight, given to animals simultaneously with or immediately after parenteral introduction of Sr^{90}, decreased the absorption of the isotope by 13.0–48.5% as compared with controls. When magnesium sulfate was injected 30 days after introduction of the isotope it produced no protective effect. The suppression of Sr^{90} absorption may be due to an increase in isotope elimination with urine. Magnesium has no effect on the ratio of the filterable and conjugated forms of Sr^{90} in blood.

A65-82182
EFFECT OF CYSTAMINE ON PANCYTOPENIC SYNDROME IN ACUTE RADIATION SICKNESS IN DOGS [VLIIANIE TSISTAMINA NA VYRAZHENNOST' PANTSITOPEN PANTSITOPENICHESKOGO SINDROMA OSTROI LUCHEVOI BOLEZNI U SOBAK].
A. S. Mozzhukhin, O. K. Makhalova, and E. N. Sokolova (S. M. Kirov Mil.-Med. Acad., Leningrad, USSR).
Radiobiologiia, vol. 5, 1965, p. 621-623. 10 refs. In Russian.

Intravenous injections of cystamine (60 mg./kg. body weight) prevented severe damage to particulate components of circulating blood in dogs subjected to ionizing radiation of 7.5 r/min. for 68 min., and decreased animal mortality. The results showed that cystamine injections before irradiation prevented severe leucopenia and erythropenia immediately and several days after the exposure. It also promoted faster regeneration of leucocytes and thrombocytes; but a complete normalization was noted even 45 days after irradiation.

A65-82183
DISTURBANCES IN CARBON METABOLISM IN EXPERIMENTAL CARBON MONOXIDE INTOXICATION [NARUSHENIE UGLEVODNOGO OBMENA PRI INTOKSIKATSII OKIS'IU UGLERODA V EKSPERIMENTE].
I. I. Datsenko (Lvov Med. Inst., Dept. of Gen. Hyg. and Dept. of Biochem., Ukrainian SSR).
Gigiena i Sanitariia, vol. 30, May 1965, p. 30-34. 5 refs. In Russian.

Prolonged exposure of rabbits to air containing 0.012-1.018 mg./l. of carbon dioxide caused a disturbance in the carbon metabolism, as detected by the distortion of the glycemic curves, in glycemia induced in animals by injections of adrenaline and insulin. The results suggest two conclusions: First, the accepted upper permissible limits of carbon monoxide contamination of air should be lowered. Second, the character of distortion of the glycemic curves may serve as an indicator in the diagnosis of carbon monoxide poisoning.

A65-82184
EFFECT OF CLIMATIC CONDITIONS ON CHRONIC IRRADIATION WITH ULTRA-HIGH FREQUENCY ENERGY [K VOPROSU O VLIIANII KLIMATICHESKIKH USLOVII PRI KHRONICHESKOM OBLUCHENII ENERGIEI SVERKHVYSOKOI CHASTOTY].
A. Ia. Loshak (Sci.-Res. Inst. of Civilian Air Transport, Moscow, USSR).
Gigiena i Sanitariia, vol. 30, Jun. 1965, p. 18-23. 9 refs. In Russian.

In workers exposed to ultra-high frequencies during work in hot climates, the functional disturbances were noted more often than in workers on the same projects in temperate climates. The combined effects of high ambient temperature and ultra-high frequency radiation affected primarily the nervous system, which showed asthenic character. It is recommended that selection of workers for such projects should be done after a strict medical examination. The personnel on the job should undergo physical examinations twice a year. Supervision of working conditions should be carefully observed, in order to assure the safety of each person.

A65-82185
EFFECT OF ULTRAHIGH FREQUENCY RADIATION ON THE FORMED ELEMENTS OF BLOOD [IZMENENIIA MORFOLOGICHESKOGO SOSTAVA KROVI PRI VOZDEISTVII SVERKHVYSOKIKH CHASTOT].
G. G. Lysina (Kiev Sci.-Res. Inst. of Hyg. Labor and Prof. Diseases, USSR).
Gigiena i Sanitariia, vol. 30, Jun. 1965, p. 95-96. 8 refs. In Russian.

Soviet workers exposed to ultra-high frequency radiation while on electronic projects often complain about malaise, headaches, irritability, dizziness and general fatigue. Clinical examinations disclosed functional disturbances characteristic of dystonia of the parasympathetic system. Laboratory tests showed basophilic stippling and reticulocytosis, which indicated the disturbance of normal poiesis of red blood cells. This condition is usually found in cases of industrial poisoning, such as lead, benzine, mercury and bismuth. This condition precedes development of hypochronic anemia. In 30% of investigated cases the sedimentation rate was decreased. No leucocytosis was present. The results suggested the necessity of periodic medical examination of all personnel directly connected with ultra-high frequency projects.

A65-82186
CHANGES IN MYOCARDIAL OXYGEN TENSION WITH ALTITUDE AND ACCELERATION [IZMENENIE NAPRIAZHENIIA KISLORODA V MYSHTSE SERDTSA PRI POD'EMAKH NA VYSOTU I PRI DEISTVII USKORENIIA].
E. A. Kovalenko and V. I. Korol'kov.
Fiziologicheskii Zhurnal SSSR, vol. 51, Aug. 1965, p. 966-973. 12 refs. In Russian.

The experiments were conducted in dogs with electrodes implanted into the cardiac muscle. The animals were kept in a pressure chamber, in which various altitudes were simulated, or they were subjected to acceleration stress of 2-12 g during three minutes. The fall of pressure equivalent to 2, 4, 6 km. altitude caused a fall in cardiac muscle oxygen tension hg 15, 28, and 373, respectively. There was no hypoxic effect or any noticeable changes in the character of the electrocardiogram tracings. The 8 and 12 km. altitude caused a fall in oxygen tension by 52 and 583, respectively. At these altitudes the hypoxic disorders, and cardiac potentials changes were noted. Acceleration produced initial rise in the oxygen partial pressure of the cardiac muscle, which was followed by a fall. During transverse acceleration of 2 and 4 g the oxygen tension returned to normal at the end of three minutes. During 6, 8, 10 and 12 g the tension fell to 87, 85, 72 and 63% of normal. In positive vertical acceleration the tension fall was even more pronounced. It is concluded that circulatory disturbances are more affected by hypoxic conditions than by the acceleration stress.

A65-82187
THE DEPENDENCE OF THE AMINO ACID COMPOSITION OF THE GREEN ALGA SCENEDESMUS QUADRICAUDA (TURP.) BREB. ON NUTRITION WITH DIFFERENT NITROGEN SOURCES [ZAVISIMOST' AMINOKISLOTNOGO SOSTAVA ZELENOI VODOROSLI SCENEDESMUS QUADRICAUDA (TURP.) BREB. OT ISTOCHNIKA AZOTNOGO PITANIIA].
V. IAska (Estonian SSR, Acad. of Sci., Inst. of Zool. and Botany, Tallinn).
Eesti Nsv Teaduste Akadeemia Toimetised, Bioloogiline Seeria, vol. 14, 1965, p. 175-179. 11 refs. In Russian.

The amino acid composition of the green alga Scenedesmus quadricauda (Turp.) Bréb., depending on nutrition with different nitrogen sources (potassium nitrate, ammonium bicarbonate and urea), has been studied by quantitative paper chromatography. It has been shown, as a result of this study, that Scenedesmus quadricauda, when grown with either ammonia or urea nitrogen, contained 2.4 and 2.9 times respectively more arginine as compared with nitrate nutrition. The amount of other amino acids did not depend considerably on the nitrogen source used. The increase in the nitrogen-rich amino acid, arginine, appeared to be responsible for an increase in the protein and total nitrogen content of the alga in the case of its ammonia and urea nutrition. The total nitrogen content of the alga, when cultivated in autumn, was significantly lower than that in spring or in summer. The carbohydrate content increased in autumn on nitrate medium only, but not on ammonia or urea medium. The reason for this variation remained unsolved in the present study.

A65-82188
FLASH BLINDNESS.
John Lott Brown (Pa. U., School of Med., Dept. of Physiol., Philadelphia).
American Journal of Ophthalmology, vol. 60, Sep. 1965, p. 505-520. 51 refs.
Grants PHS B2205 and GM-15277; and Gen. Elec. Co. supported research.

Possible eye injuries and the change in sensitivity of the eye following exposure to high energy levels are discussed in relation to light from the sun and from atomic bomb bursts. Laboratory studies of the transient, relative blindness which follows exposure to high luminance light flashes are reviewed. A mathematical formulation is presented which permits prediction of the duration of blindness following a bright flash before a known target at specified luminance can be seen. The formulation predicts that elevation of target luminance to 500 ft.-L will afford target visibility within two or three seconds after exposure to any blinding flash as long as there is insufficient energy in the flash to cause retinal injury. Various protective techniques are discussed.

A65-82189
PLASMA FREE OLEIC AND PALMITIC ACID LEVELS DURING VIGOROUS EXERCISE.
Peter Wood, Guenter Schlierf, and Laurance Kinsell (Highland-Alameda County Hosp., Inst. for Metab. Res., Oakland, Calif.)
Metabolism Clinical and Experimental, vol. 14, Oct. 1965, p. 1095-1100. 25 refs.
Grant PHS 00955; and Corn Prod. Co. supported research.

The behavior of plasma free palmitic and oleic acids was studied without the use of radioactive tracers in fasting human subjects during vigorous exercise and following rest. The initial level of total plasma free fatty acids (FFA) fell during a period of vigorous exercise, and the proportions of palmitic and oleic acids in the total FFA rose and fell, respectively. Further exercise followed by rest resulted in a considerable increase of total FFA level; the proportion of oleic acid rose towards the proportion present in the adipose tissue lipids of the particular subject, while the palmitic acid proportion fell. These changes are interpreted to mean that during muscular activity, uptake of FFA from plasma proceeds in such a manner that oleic acid has a measurably greater fractional turnover rate than has palmitic acid.

A65-82190
DIAGNOSIS OF DISTURBANCES OF VESTIBULAR FUNCTION AFTER HEAD TRAUMA [NACHWEIS VESTIBULARER REGULATIONSSTORUNGEN NACH SCHADELHIRNTRAUMEN].
H.-J. Schöder (Humboldt- U., Klin. und Poliklin. für Hals- Nasen- Ohren-Krankh., Berlin, East Germany).
HNO, vol. 13, Jan. 1965, p. 25-27. 21 refs. In German.

Statistics are assembled on the diagnosis and treatment of 165 patients with cranial trauma. Subjective feelings of dizziness were in all cases confirmed by objective vestibular tests. Prompt otological examination after the

accident is recommended in combination with thorough investigation for spontaneous nystagmus and positional and orientation tests to provoke latent nystagmus. Central nervous disturbances are best revealed by a rotation test with electronystagmography.

A65-82191
EFFECT OF ALPHA-METHYL-DOPA ON HEART AND PULMONARY ARTERIES OF HYPOXIC MICE.
Richard L. Naeye (Vt. U., Coll. of Med., Dept. of Pathol., Burlington).
American Journal of Physiology, vol. 209, Oct. 1965, p. 702-704. 11 refs. Grant Natl. Heart Inst. HE 06469-04.

Fifty mice were placed in an atmosphere of 10% oxygen and sacrificed at intervals. Twenty-one of the animals were simultaneously given methyldopate-HCl. Hypoxic control mice developed medial hyperplasia in small pulmonary arteries and right ventricular cardiac hypertrophy. These abnormalities did not develop in the drug-treated animals.

A65-82192
TISSUE LACTIC DEHYDROGENASE ISOZYMES: VARIATION IN RATS DURING PROLONGED COLD EXPOSURE.
William F. Blatt, John Walker, and Milton Mager (U.S. Army Res. Inst. of Environ. Med., Pharmacol. and Biochem. Labs., Natick, Mass.)
American Journal of Physiology, vol. 209, Oct. 1965, p. 785-789. 20 refs.

Total lactic dehydrogenase (LDH) activity as well as the relative distribution of heart- and muscle-type subunits was assayed in tissues of rats chronically exposed to cold (6 weeks, 5° C.). A depression of LDH activity was noted in heart and liver following 1 week at 5°C., restoration to normal levels occurred in weeks 2, 3, and 4 which persisted for heart tissue; liver values fell below normal limits for the final 2 weeks of study. No significant changes in total activity or in subunit distribution were seen in kidney, muscle, plasma or red blood cells. A progressive increase in the ratio of heart to muscle type was noted in heart muscle with a final level almost twice that of the control value. The changes in total activity as well as the relative distribution of the subunits may be related to substrate availability, tissue oxygen supply, or hormone action; the study did not permit assessment of any of these parameters as the causative factors. The adaptive change observed in heart muscle affords a possible example of the modification of genic expression by environmental stress.

A65-82193
CAPACITY OF RECOGNIZING MASKED FIGURES AFTER SENSORY-MOTORIC DEPRIVATION [CAPACITA DI RICONOSCIMENTO DI FIGURE MASCHERATE DOPO PRIVAZIONE SENSO-MOTORIA].
P. Bonaiuto, C. Umilta, and R. Canestrari (Bologna U., Ist. di Psicol.; and C.N.R. Gruppo di Ric. di Psicol., Italy).
Bollettino della Società Italiana di Biologia Sperimentale, vol. 41, May 31, 1965, p. 523-526. 16 refs. In Italian.

Following a period of isolation and immobility adult subjects were exposed to a series of perception tests (Gottschaldt figures, Thurstone, Teuber, Weinstein tests, etc.). Three situations were characterized as easily recognized, and another three as difficult to recognize. Within one minute, control subjects accurately recognized the figures presented 59 times out of a total of 72 exposures, with 13 errors, whereas persons subjected to sensory-motor deprivation accurately recognized the figures 69 times out of 72 presented, with only 3 errors. The difference is statistically significant, for $p < 0.02$. Of the three easy situations, no special difference between isolated normal subjects was noted. Of the three difficult situations, 24 out of 33 were recognized accurately, based on 36 presentations, showing a significant difference, $p < 0.05$. It is postulated that after conditions of sensory-motor deprivation, perceptive organizations based on factors of field, present various characteristics and depend on motivational capabilities to sustain the significant difference between the two groups. Included are tabulations of the recognition times in seconds with totals of accurate recognitions, and totals in absolute and percent values of accurate responses at various times.

A65-82194
ACTION OF AMPHETAMINE ON NYSTAGMIC RESPONSE TO ROTATION-ACCELERATORY STIMULI: EXPERIMENTAL STUDY CONDUCTED ON THE RABBIT [L'AZIONE DELL'AMFETAMINA SULLA RISPOSTA NISTAGMICA DA STIMOLI ROTACCELERATORI. STUDIO SPERIMENTALE CONDOTTO SUL CONIGLIO].
V. Cenacchi, G. Fenu, and L. Gabrielli (Cagliari U., Ist. di Clin. Otorinolaringoiatrica, Italy).
Bollettino della Società Italiana di Biologia Sperimentale, vol. 41, May 31, 1965, p. 527-530. 24 refs. In Italian.

Twenty adult rabbits were subjected to angular acceleration of 4°/second for 10 seconds prior to, and 15 minutes after the intravenous administration of amphetamine. Doses of 0.5-1 mg./kg. amphetamine produced a significantly sufficient decrease in the induced nystagmic response. At higher doses (3 mg./kg.) a significant reduction of the nystagmic response was also noted; at doses of 19 mg./kg. the response practically disappeared. It is suggested that the action of amphetamine not be considered as causing an increase in the activity of reticular formation, but as strengthening the impulses of sensory origin from the integrative centers of the reticular formation and causing a state of secondary hyperactivity and electrocortical modifications.

A65-82195
DYNAMIC INVESTIGATION OF ADRENAL CORTEX FUNCTION IN SUBJECTS WITH SYMPTOMS OF BENZOL POISONING [INDAGINE DINAMICA DELLA FUNZIONALITA CORTICOSURRENALICA IN SOGGETTI CON SEGNI DI INTOSSICAZIONE DA BENZOLO].
A. Cavalieri and A. Salvadeo (Pavia U., Ist. di Med. del Lavoro, Italy).
Lavoro Umano, vol. 17, Apr. 1965, p. 165-171. 18 refs. In Italian.

The adrenocortical function was studied in eight patients between 20 and 59 years of age with hematological symptoms of benzene poisoning, and compared with data from an equal number of normal subjects between the same ages. Basal values of 17-ketosteroids and 17-hydroxycorticoids excreted in the urine were found to be almost identical. The response to exogenous corticotrophin (ACTH) was lower in subjects with symptoms of benzene poisoning, but the difference was not statistically significant. These data indicate that no significant change in adrenocortical function occurs during benzene poisoning.

A65-82196
AN INFORMATION-FLOW MODEL OF THE ORGANIZATION OF MOTOR ACTIVITY. PART II: SAMPLING, CENTRAL PROCESSING AND UTILIZATION OF SENSORY INFORMATION.
Richard Allen Chase (Johns Hopkins U. School of Med., Dept. of Psychiat., Neurocommunications Lab., Baltimore, Md.)
Journal of Nervous and Mental Disease, vol. 140, May 1965, p. 334-350. 47 refs.

This is the second of two papers on an information-flow model of the organization of motor activity. Major features of this model are represented schematically. The first part was concentrated on the peripheral transducer systems: transmission and central control of sensory information. This part deals with the sampling, central processing, and utilization of sensory information. In support are cited data from reaction-time, pursuit tracking, delayed auditory and visual feedback, ethological investigations on song acquisition in birds, and conditioned reflex. Disturbances in the system are discussed with references to the manifestations in patients with various abnormalities of motor control, e.g. Parkinson's disease, cerebellar lesions, tabes dorsalis.

A65-82197
MEDICAL SUPPORT OF SPACE OPERATIONS.
John E. Boysen (TWA/MILA, Med. Serv., Cocoa Beach, Fla.)
(Am. Acad. of Occupational Med., 17th Ann. Meeting, Columbus, Ohio, Feb. 17-19, 1965).
Archives of Environmental Health, vol. 11, Sep. 1965, p. 311-315.

The problems of establishing and developing an effective occupational health program at the Merritt Island Launch Area, America's first true space port, are many and unique. Their nature stems largely from a changed concept of government contracting for nonpersonal services. It is compounded by the multitude of contractors and subcontractors involved and stimulated by the importance of good medical support for this vital, national program of space exploration. The answers to some of these problems have been discussed and the goals have been briefly described. Time should provide a more definitive program which will befit the quality and importance of the United States program of space exploration.

A65-82198
EXPERIMENTAL PSYCHOLOGICAL DIFFERENTIATION OF THE EFFECT OF TWO PSYCHOSTIMULANTS ON MAN (F-1983 AND AMPHETAMINE) [EXPERIMENTELL-PSYCHOLOGISCHE DIFFERENZIERUNG DER WIRKUNG VON ZWEI PSYCHOSTIMULANTIEN AM MENSCHEN (F-1983 UND AMPHETAMIN)].
H. Heimann and G. Lukàcs (Lausanne U. Clin. Psychiat., Centre de Rech. Psychopathol., Switzerland).
Psychopharmacologia, vol. 8, 1965, p. 79-90. 9 refs. In German.

A method is described which makes possible a quantitative assessment of fatigue after one sleepless night and the study of its neutralization by two different drugs. A qualitative difference between the stimulating effect of amphetamine and the new drug F-1983 (1-p-tolyl-1-oxo-2-pyrrolidino-n-pentan-hydrochloride) is demonstrated by means of combining psychological stress and relaxation and graduated motor stress in the performance test. Eighteen students were given 10 mg. amphetamine, 60 mg. F-1983 or placebo in a double-blind study. In the short period of stress with an essential motor factor of performance, amphetamine produced inferior results than F-1983 (and even placebo). During the period of relaxation with less motor activity, both drugs had a similar stimulating effect in comparison to placebo. The described differences between these two drugs is related to a more important activation of motor function produced by amphetamine in contrast to F-1983.

A65-82199
CONTRAST SENSITIVITY OF THE HUMAN EYE FOR SQUARE-WAVE GRATINGS.
H. A. W. Schober and R. Hilz (Munich U., Inst. für med. Optik, West Germany).
Journal of the Optical Society of America, vol. 55, Sep. 1965, p. 1086–1091. 14 refs.

The contrast threshold for perception of square-wave gratings as depending on spatial frequency is measured for varying viewing distances, adaptation and exposure time. The luminance varied between 1.4 and 110 cd/m.^{2}; target distances were 1, 3.1, and 7 m. Exposure times ranged from 1.5 msec. to 1 sec. and unlimited. A distinct minimum threshold contrast is observed for a definite spatial frequency, which depends on the viewing distance and luminance. A decrease in exposure time causes a less significant minimum. Exposure times from 40 to 1.5 msec. do not alter the curve decisively. With exposure times less than 2 msec. and spatial frequencies somewhat above 0.02 lines/min. of arc the optical transfer function of the eye can be measured by determination of thresholds.

A65-82200
ACCOMMODATIVE ASTIGMATISM AND PATTERN ACUITY.
Jacob Beck (Harvard U., Psychol. Labs., Cambridge, Mass.)
Journal of the Optical Society of America, vol. 55, Sep. 1965, p. 1139–1142.
Grants NSF GB-1521 and GB-2901.

Visual acuity for vertical and horizontal lines on targets containing both was found to be unequal, though there was no detectable astigmatism in the unaccommodated eye. This difference in acuity, which tends to favor the vertical lines, is a function of accommodation and is affected systematically by changes in the vergence of the light rays. The findings suggest that the observed asymmetry in acuity resulted from a vertical–horizontal astigmatism produced by accommodation. Thus, the absence of detectable astigmatism in the unaccommodated eye is not sufficient to rule out dioptric factors as a cause of the often-reported effects of orientation on pattern acuity.

A65-82201
EFFECT OF FOCUS ON THE VISUAL RESPONSE TO A SINUSOIDALLY MODULATED SPATIAL STIMULUS.
D. G. Green and F. W. Campbell (Cambridge U., Physiol. Lab., Great Britain).
Journal of the Optical Society of America, vol. 55, Sep. 1965, p. 1154–1157. 8 refs.
Grant PHS NB 05046-01; and NSF supported research.

The recent development in the use of sinusoidal gratings for the analytical study of optical systems has been applied to the effects of focus and pupil aperture on visual resolution. For an eye with a dilated pupil, the in-focus position is shown to depend upon the spatial frequency of the test target. The effective refractive power of the eye increases for the detection of low-frequency gratings. If the eye is corrected for this change in effective refractive power, an improvement of about 70% in contrast sensitivity occurs for low spatial frequencies. The implications of these findings on the phenomenon of "night myopia" are discussed.

A65-82202
EFFECT OF TARGET SIZE, LUMINANCE, AND COLOR ON MONOCULAR FIXATION.
Robert M. Steinman (Md. U., Dept. of Psychol., College Park).
Journal of the Optical Society of America, vol. 55, Sep. 1965, p. 1158–1165. 15 refs.
Soc. of Sigma Xi and RESA Fund supported research.

A contact-lens technique was used to record eye movements made by two subjects attempting to maintain fixation at the center of concentric round targets of several sizes (1.9'–87.2' diam.) and luminances (2.8, 7.8, and 21.5 mL). Fixation of red, blue, and white 1.9'diam. targets was also examined. Analysis of variance designs were employed to remove variability arising from sources other than these stimulus variables. Statistically reliable differences in mean fixation position were found with targets of different size, luminance, and color. The largest difference observed was less than 4 and under most conditions was less than 2. The bivariate dispersion of the eye about its mean position varied in a complex manner with the size and luminance of the target object. No statistically reliable effects of stimulus variables were found on drifts. Saccade frequency was considerably reduced with the largest targets. Results are discussed in terms of a "fixed error-signal system" for the control of eye position.

A65-82203
ACCURACY OF ELECTROCARDIOGRAPHIC MEASUREMENTS BY COMPUTER.
Robert J. Dobrow, Juan B. Calatayud, Sidney Abraham, Anna Lea Welhrer, Cesar A. Caceres (Hew, Div. of Chronic Diseases Control Program, Washington, D. C.), Patrick A. Gorman (George Washington U., Washington, D. C.).
American Journal of Medical Electronics, vol. 4, Jul.–Sep. 1965, p. 121–126. 9 refs.

To assess the accuracy of computer measurement of ECG's, a sample of 200 ECG leads processed by computer was compared with a "standard" established by physician measurement of these leads. Computed measurements were highly accurate. Reproducibility of computer results was evaluated by comparing 10 individual computer runs on a single patient's ECG and by comparing duplicate computations on 20 individual tracings. The very narrow range of results and small standard deviations found attest to the system's precision. These results provide a basis for confidence in computer identification and measurement of ECG waves.

A65-82204
MINIATURE BIOPOTENTIAL TELEMETERING SYSTEM.
Gordon J. Deboo and Thomas B. Fryer (NASA, Ames Res. Center, Moffett Field, Calif.).
American Journal of Medical Electronics, vol. 4, Jul.–Sep. 1965, p. 138–142. 5 refs.

A subminiature, high-performance, biopotential telemetering system has been developed that features miniature size, inexpensive components and simple construction. The transmitter operates at approximately 90 megacycles. Interchanging three components in the basic circuit developed provides two versions of the device; one has a 2-day operating life with a 100-foot range while the other has a 48-day operating life with a 10 foot range. Careful circuit design and the use of new silicon transistors operated at very low current levels allow these features to be attained without sacrificing performance.

A65-82205
EVOKED NON-SPECIFIC RESPONSES OF THE SENSORY-MOTOR CEREBRAL CORTEX TO NONDIFFERENTIATED AND UNCONDITIONED STIMULI [VYZVANNYE NESPETSIFICHESKIE OTVETY SENZOMOTORNOI KORY BOL'SHIKH POLUSHARII CHELOVEKA NA INDIFFERENTNYE, SIGNAL'NYE I BEZUSLOVNYE RAZDRAZHITELI].
S. N. Raeva (USSR, Acad. of Med. Sci., N. N. Burdenko Inst. of Neurosurg., Moscow; and USSR, Acad. of Sci., Inst. of Higher Nervous Activity and Neurophysiol., Moscow).
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 15, Jul.–Aug. 1965, p. 603–610. 12 refs. In Russian.

Potentials were recorded from the human sensory-motor cerebral cortex of the type of non-specific responses to tactile and acoustic stimuli, under different experimental conditions: repeated presentation of the stimuli (1st series), elaboration of a conditioned connection (2nd series). In the 1st series the responses to tactile stimuli, as compared to those to sound were characterized by greater stability and increasing asymmetry of manifestation with a predominance in the contralateral hemisphere. In the 2nd series, quite the contrary, responses to conditioned acoustic signals were characterized by greater stability, greater similarity of form and a more distinct asymmetric manifestation in the contralateral hemisphere. Conditioned local EEG responses often failed to reproduce unconditioned local EEG changes. At a certain stage of elaboration, conjugate EEG responses were revealed to conditioned and unconditioned stimuli. The above facts help to understand some regularities in the joint work of the two thalamic systems and their role in the mechanism of conditioning in man.

A65-82206
CORRELATION ANALYSIS OF CHANGES IN THE HUMAN ELECTROENCEPHALOGRAM DURING ELABORATION OF A RHYTHMIC MOTOR STEREOTYPY [KORRELIATSIONNYI ANALIZ ELEKTROENTSEFALOGRAMMY CHELOVEKA PRI VYRABOTKE RITMICHESKOGO DVIGATEL'NOGO STEREOTIPA].
I. S. Dobronravova and V. P. Gundarov (USSR Acad. of Sci., Inst of Higher Activity and Neurophysiol., Moscow; and USSR Min. of Public Health, Res. Inst. of Med. Instr. and Equipment, Moscow).
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 15, Jul.–Aug. 1965, p. 624–630. 26 refs. In Russian.

Correlation analyses of the changes in the electroencephalogram of the occipital lobe and the precentral area of the left hemisphere, and of the precentral area of the right hemisphere, during directed rhythmic flexing of the phalanges of the right hand were studied in human subjects. An electromyogram was taken simultaneously. Motor stereotypy was induced by rhythmical photic flickers. The photic stimulus did not cause any essential changes in the maximal values of the crosscorrelating functions of the electroencephalogram; but the motor stereotypy induced by flickers increased the degree of correlation. Maximum correlation was noted during the first minute of the rhythmic motion. The crosscorrelation of occipital and precentral areas remained constant during motion, which lasted three minutes, and gradually returned to normal after the motion was stopped. The degree of crosscorrelation between the occipital lobe and the precentral areas were less than between the precentral areas. The alpha rhythm was constant throughout the experiment.

A65-82207
THE EFFECT OF ACCELERATION ON FOOD-REINFORCED DRL AND FR.
Julaine L. Beasley and Barbara L. Seldeen (NASA, Ames Res. Center, Neurobiol. Branch, Moffett Field, Calif.)
Journal of the Experimental Analysis of Behavior, vol. 8, Sep. 1965, p. 315–319. 14 refs.

Performance on differential reinforcement of low rates (DRL), 10 sec. and fixed ratio (FR) was studied after exposure to acceleration. After four rats, two on each of the above schedules, had stabilized, they were exposed to 5 hr. of acceleration at 5 g immediately before daily experimental sessions. Food intake was also studied in rats given access to food daily in their home cages and exposed to acceleration immediately before the free-feeding session. Weight gain of free-feeding animals and reinforcement intake of experimental animals dropped after acceleration. Overall response rate on the FR was depressed markedly by acceleration but local response rates did not appear to be affected. Inter-response time (IRT) distributions of DRL sessions after acceleration were markedly shifted toward the long intervals. A sequential plot of IRT's on acceleration days showed an altered, but relatively stable, temporal patterning of responses followed by an abrupt return to the normal baseline toward the end of the session.

A65-82208
THE HUMAN PRESERVE.
I. J. Good (Trinity Coll., Oxford, Great Britain).
Spaceflight, vol. 7, Sep. 1965, p. 167–170, 180. 16 refs.

The author presents a speculative picture of the existence of extraterrestrial life. Biologically functioning and reproductive beings possessing the faculty of modifying the ambient environment, who may inhabit the planets, in or outside our galaxy, may have a different chemical structure than the carbon-base ones found on earth. Silicon is one chemical element around which polymeric structures could be built. The pros and cons to the theory of panspermia are discussed. One of the main objections (that spores could not survive space radiation) may be offset by the assumption of "ultra-intelligent entities" who applied a protective coating to the spores prior to ejaculating them into space. However, the main objection is on a statistical basis. In the exploration of space, man may be forced to communicate with inhabitants of the universe. Also, he must continue to preserve contact with ground support personnel and fellow astronauts orbiting the earth in space stations or on other extensive interplanetary or extra-galactic flights. The author speculates on the mode of such communications.

A65-82209
DYNAMICS AND REVERSAL OF BEHAVIORAL RESPONSE OF ANIMALS TO VARIOUS HYPOXIC MEDIA [DINAMIKA I PEREDELKA DVIGATEL'NOI REAKTSII ZHIVOTNYKH NA RAZLICHNYE GIPOKSICHESKIE SREDY].
I. S. Breslav (USSR, Acad. of Sci., I. P. Pavlov Inst. of Physiol., Leningrad).
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 15, Jul.–Aug. 1965, p. 677–682. 14 refs. In Russian.

Avoidance response to various atmospheres deficient in oxygen was studied in white mice under conditions of active choice in a special chamber with a gradient of oxygen content. The intensity of the response depended on the degree of the oxygen content decrease in the hypoxic zone. Behavioral reactions to a sharply pronounced hypoxic atmosphere (7.5% and particularly, 2% O_2) were difficult to reverse. This was apparently due to the stability of the conditioned reflex and the depressing effect of anoxia on the reflex activity of the nervous system. The formation of the animals' behavioral reaction to a local reduction of oxygen content in the environment apparently occurred on the basis of interaction of intero- and exteroceptive impulses.

A65-82210
THE DEPENDENCY OF EJECTION TIME ON THE HEART RATE [ZUR FREQUENZABHANGIGKEIT DER AUSTREIBUNGSZEIT].
W. Auinger, J. M. Gudin-Herrero, O. Hartl, F. Kaindl, and P. Kühn (Vienna, 2. Med. Universitätsklin., Austria).
Zeitschrift für Kreislaufforschung, vol. 54, Mar. 1965, p. 227–229. 17 refs. In German.

The ejection time was determined from carotid sphygmograms for 206 individuals, free from heart disease, and correlated with the heart rate. In a frequency range of 55 to 110 beats per minute an almost linear correlation of the corresponding mean values was obtained with a pronounced scatter. A diagram is included for a relatively easy determination whether or not the ejection time of a certain subject is within the normal range.

A65-82211
THE ELECTROCARDIOGRAM IN ERGOMETRIC PERFORMANCE [DAS ELEKTROKARDIOGRAMM BEI ERGOMETRISCHEN LEISTUNGEN].
W. Minx and H. Mellerowicz (Inst. für Leistungsmed., Berlin, East Germany).
Zeitschrift für Kreislaufforschung, vol. 54, May 1965, p. 448–456. In German.

One hundred untrained, healthy male subjects, 20 to 40 years of age, were given standardized ergometric exercise of 100 watts per min. Electrocardiograms were registered at rest, immediately after exercise, and after 3 min. recovery. The data were used in the analysis leading to statistical differentiation of the physiological exercise ECG from the pathological exercise ECG. Deviations in excess of $\pm 2\sigma$ are indicative of pathological changes in the cardiac impulse conduction after exercise. Causal factors considered are (1) impairment of different etiology of excitation conduction system and the myocardium, (2) metabolic changes, and (3) autonomic dysregulation.

A65-82212
THE EFFECT OF PULSE RATE ON CONTRACTION PHASES OF THE HEART [EINFLUSS DER PULSFREQUENZ AUF DIE KONTRAKTIONSPHASEN DES HERZENS].
Erich F. Lang (Stadtische Krankenanstalt, Med. Klin., Aschaffenburg, West Germany).
Zeitschrift fur Kreislaufforschung, vol. 54, May 1965, p. 479–488. 14 refs. In German.

An investigation was made on the correlations among the cardiac ejection period, the isometric phase and their partial phases, and the pulse rate. The data were obtained from 180 individuals with normal cardiovascular systems. Both the ejection-period and the isometric phase decrease inversely to heart rate. This also holds true for the pressure phase but not for the transformation phase. The isometric phase increases more in normal individuals over 50 years of age than below 50 years. The mean isometric phase is significantly higher after the age of 50 than in the younger age groups. This is explained on the basis of the appearance of "physiological old age heart insufficiency."

A65-82213
INVESTIGATION ON THE EXTENT OF DIURNAL VARIATIONS IN THE ELECTROCARDIOGRAM OF HEALTHY SUBJECTS [UNTERSUCHUNGEN UBER DAS AUSMASS VON TAGESSCHWANKUNGEN IM EKG GESUNDER VERSUCHSPERSONEN].
Diether Berges (Munster U., Inst. fur Sportmed. and Physiol. Inst., West Germany).
Zeitschrift fur Kreislaufforschung, vol. 54, Jan. 1965, p. 35–49. 56 refs. In German.

Electrocardiograms, lead II, were registered in 20 healthy physical education students. The experiment lasted 25 hours and included complete bedrest and fasting. The results show that the diurnal variations of various ECG parameters may be observed also in the normal subject. They amount to $\pm 3.3\% \pm 5.5\%$ of the average in the case of intervals, and $\pm 7.5\%$ and $\pm 14.0\%$ in the case of the amplitudes (R;T). It is concluded that diurnal variations in ECG are not registered by the usual techniques. The variations have a distinct diurnal character with a close relation between the times of the maxima and minima of the curve. The extremes may occur at any time of the day. Within certain limits the diurnal variations are independent of the changes in heart rate.

A65-82214
THE EFFECT OF THE DURATION OF BEDREST AND OF THE STRESS OF EXERCISE ON THE ELECTRODERMATOGRAM IN THE NORMAL INDIVIDUAL AND IN PATIENTS WITH CIRCULATORY DISTURBANCES [EINFLUSS DER LIEGEZEIT UND ARBEITSBELASTUNG AUF DAS ELEKTRODERMATOGRAMM DEI NORMALEN UND DURCHBLUTUNGSGESTORTEN].
Joachim Wichmann and Freimut Borngen (Halle (Saale), I. Med. Universitatsklin., East Germany).
Acta Neurovegetativa, vol. 27, 1965, p. 200–206. 6 refs. In German.

The influence of rest and exercise on the electrodermal response was tested in patients with peripheral obliterating arteriopathy and a group of normal persons. The conductability of skin was significally reduced in normal persons after a rest state of two hours. It was increased however, in patients with arteriopathy under comparable conditions. The conductability of skin was increased in normal persons after prolonged exercise. This effect was less expressed in patients with arteriopathy. The authors suggest a state of rest or prolonged exercises prior to the measurement of the electrodermal response.

A65-82215
INFORMATION ABOUT SPATIAL LOCATION BASED ON KNOWLEDGE ABOUT EFFERENCE.
Leon Festinger and Lance Kirkpatrick Canon (Stanford U., Calif.).
Psychological Review, vol. 72, Sep. 1965, p. 373–384. 10 refs.
Grant NIH MH 07835-01.

An experiment was designed to determine whether or not the human organism possessed "outflow" information derived from monitoring nerve impulses in motor pathways. The experiment focused on the extraocular muscles since proprioceptive input to the central nervous system from these muscles is poor. The results show that in the absence of good proprioceptive information, the presence or absence of "outflow" information makes a difference in accuracy of localizing an object in space.

A65-82216
CENTRENCEPHALIC THEORY AND INTERHEMISPHERIC TRANSFER OF VISUAL HABITS.
Robert Thompson (La. State U., Baton Rouge).
Psychological Review, vol. 72, Sep. 1965, p. 385–398. 15 refs.
Grant Natl. Inst. of Mental Health MH-08377-01.

Recent anatomical and psychological data suggest that visual pattern-discrimination habits are mediated by a direct occipito-mesencephalic tract, while a simple brightness-discrimination habit is mediated by an occipito-protectotegmental pathway. Both of these projections are homolateral. By assuming that the memory trace develops at the terminal endings of the occipito-fugal pathway subserving the learned response, it is possible to explain the presence or absence of interocular transfer in split-brain animals. This scheme represents an extension of Penfield's centrencephalic theory and a defense for the possible existence of a subcortically induced memory trace.

A65-82217
LIFE IN THE UNIVERSE—INTIMATIONS, AND IMPLICATIONS FOR SPACE SCIENCE.
Cyril Ponnamperuma (NASA, Ames Res. Center, Exobiol. Div., Moffett Field, Calif.)
Astronautics and Aeronautics, vol. 3, Oct. 1965, p. 66–69. 6 refs.

The constitution of living matter on earth as compared to that of possible forms on other planetary bodies (especially Mars) is discussed in relation to findings and speculations from various chemical and biochemical studies. The results from laboratory experiments and conclusions from study of chemical bonding can be applied to the program on the search for extraterrestrial life. That molecules of biological significance can be synthesized abiologically has been demonstrated. The finding, therefore, of biological compounds on the surface of Mars does not prove that life exists there. Chemical studies on Martian samples must be followed by more direct evidence of life, such as metabolism and reproduction. If life is the result of the inevitable evolution of matter, moreover, life elsewhere in the universe will be very similar to that on earth, at least chemically, i.e., based on carbon and employing nucleic acids and proteins. There is, consequently, justification in designing life-detection experiments on the basis of what is known about life on earth.

A65-82218
AUTOMATED LIFE DETECTION
Richard S. Young (NASA, Ames Res. Center, Exobiol., Div., Moffett Field, Calif.)
Astronautics and Aeronautics, vol. 3, Oct. 1965, p. 70–76.

Possible means for exploring extraterrestrial bodies and for studying their biological and physical evolution are discussed. Mars continues to offer the greatest potential for biological activity and to command the most interest from the scientific community for its physical, geological, and chemical characteristics. The most familiar environmental factors of Mars suggesting biological possibilities are: (1) atmosphere, (2) radiation, (3) surface composition, (4) pole caps, (5) dark and light regions, (6) clouds, (7) temperature, (8) pressure, (9) water, (10) Sinton bands suggesting presence of carbon compounds on Mars' surface, and (11) microenvironments. The manifestations of life most often listed as demonstrating unequivocally the existence of extraterrestrial life are growth, movement, irritability, reproduction, and metabolism. Chemical composition is generally included as a characteristic of living things. The selection of life-detection instrumentation must consider those experiments which are most indicative of life as opposed to those likely to give informative results. The urgency of life detection before planetary contamination by terrestrial organisms requires an experimental package that is sterile, lightweight, automatic, and fully integrated.

A65-82219
BIOLOGY AND THE EXPLORATION OF MARS: SUMMARY AND CONCLUSION OF A STUDY BY NAS SPACE SCIENCE BOARD.
Astronautics and Aeronautics, vol. 3, Oct. 1965, p. 77–82.

The National Academy of Sciences presents a report discussing whether a biological exploration of Mars should be included in the United States' space program over the next few decades; and outlining what that program, if any, should be. The discussion includes the following: (1) the origin and nature of life, (2) the possibility of life on Mars, (3) the scientific aims of Martian exploration, (4) avoiding the contamination of Mars, (5) avenues of approach to the exploration of Mars, and (6) the timing and over-all strategy of explorations. It is concluded that the 1969–73 opportunities can and should be exploited for a substantial program of planetary missions. By that time the Saturn booster system will be available, and a four to five year lead time is evidently adequate for the development of initial spacecraft. It is suggested that at the outset a standing committee of the Space Science Board will be a useful provision. It should be charged with: (a) a continuing surveillance of progress from a scientific viewpoint, and (b) the responsibility of giving advice to the National Aeronautics and Space Administration.

A65-82220
CONTINUOUSLY RECORDED CHANGES OF THORACIC AORTIC BLOOD FLOW IN MAN IN RESPONSE TO LEG EXERCISE IN SUPINE POSITION.
Ralph S. Zitnik, Filmore S. Rodich, Hiram W. Marshall, and Earl H. Wood (Mayo Clin. and Mayo Found., Rochester, Minn.)
Circulation Research, vol. 17, Aug. 1965, p. 97–105. 26 refs.
Grant NIH H-3532.

The constant-rate-injection, indicator-dilution technic was used to determine thoracic aortic blood flow before, during, and after five minutes of single-leg exercise (bicycle ergometer) in five healthy male subjects in the supine position. Resistance to blood flow in the lower body and mean aortic pressure decreased immediately at the onset of exercise, at the same time that thoracic aortic blood flow and heart rate increased. There was a further slow rise of heart rate, mean aortic pressure, and thoracic aortic blood flow along with a decrease of lower body resistance until fairly stable levels were reached after five minutes of exercise. After five and ten minutes' rest all values tended to return toward those observed in the control state. These data are consistent with the concept that baroreceptor activity may play an important part in the early cardiovascular responses to exercise in man. Most of the cardiovascular response to this exercise occurred in the first 30 seconds.

A65-82221
EFFECTS OF DELAY AND MODE OF PRESENTATION OF EXTRA CUES ON PURSUIT-ROTOR PERFORMANCE.
Lawrence Karlin (N. Y. U., New York City).
Journal of Experimental Psychology, vol. 70, 1965, p. 438–440.

The effects on pursuit-rotor performance of using an extra cue and varying its mode of presentation were investigated in order to examine the reasons for previous results that were in conflict. An extra cue was found to be effective but variations in the interval of delay were not significant.

A65-82222
VIGILANCE AND LATENCY LEVEL OF CORTICAL SOMATIC RESPONSES TO PERIPHERAL AND CENTRAL STIMULI [LIVELLO DI VIGILANZA E LATENZA DELLE RISPOSTE CORTICALI SOMATICHE DA STIMOLI PERIFERICI E CENTRALI].
N. Dagnino, E. Favale, C. Loeb, M. Manfredi, and A. Seitun (Genova U., Clin. di Malattie Nervose e Mentali, Italy).
Bollettino della Società Italiana di Biologia Sperimentale, vol. 41, May 31, 1965, p. 546–550. 6 refs. In Italian.

A comparative study was made in 15 adult non-anesthetized cats of the vigilance and latency responses evoked by the somatic cortex during electrostimulation of neurons of the first order (peripheral nerves), of the second order (medial lemniscus) and of the third order (somatic radiations) during various phases of sleep and wakefulness. It was observed that the intracortical neuron discharge induced by stimulation of somatosensory pathways initiated and increased its peak more or less rapidly in relation to variations in vigilance level. In particular: (1) the intracortical neuron discharge induced by stimulation of the first-order neurons was initiated earlier during deep sleep rather than light sleep and wakefulness; (2) the intracortical neuron discharge caused by stimulation of neurons of the first order rather than the second order increased its peak early during light sleep, a direct comparison between deep sleep and wakefulness showed no significant difference; and (3) the intracortical neuron discharge induced by stimulation of third order neurons increased its peak without significant variations in relation to the vigilance level.

A65-82223
SOME CORRELATES OF DREAM REPORTING FOLLOWING LABORATORY AWAKENINGS.
Donald R. Goodenough, Helen B. Lewis, Arthur Shapiro, and Irving Sleser (N. Y. State U., Downstate Med. Center, Dept. of Psychiat., Psychol. Lab., New York).
Journal of Nervous and Mental Diseases, vol. 140, May 1965, p. 365–373. 10 refs.
Grants PHS MH-03885, MH-05518, and MH-K3-16,619.

Forty-six subjects were awakened from periods of Stage 1 sleep with rapid, conjugate eye movements (REM periods) and asked to describe their pre-awakening experiences. Failure to recall dreams tended to come early in the night after REM-period awakenings with relatively high arousal thresholds. "Thinking" rather than dreaming reports resembled in content waking fantasies more than dreams. In some cases thinking reports came from periods of particularly light sleep. In most cases, however, the REM periods which preceded thinking and dreaming reports could not be distinguished in terms of arousal thresholds or eye-movement activity. The possibility was suggested that many thinking reports may be the result of a failure to recall dreamlike elements from the REM-period experience, or may represent arousal artifacts.

A65-82224
VARIATION OF ATMOSPHERIC "SEEING" BLUR WITH OBJECT-TO-OBSERVER DISTANCE.
C. B. Rogers (Weapons Res. Estab., Salisbury, South Australia).
Journal of the Optical Society of America, vol. 55, Sep. 1965, p. 1151–1153.

A study has been made of the image blurring introduced by a thermally turbulent atmosphere under poor "seeing" conditions for horizontal sight lines. The root-mean-square radius of the blur circle is shown to increase approximately as the square root of the range up to the maximum range considered, using optical transfer techniques. This is in good agreement with a recent theoretical model of light transmission through a turbulent optical medium.

A65-82225
SOME OBSERVATIONS ON AIRMEN WHO BREAK DOWN DURING BASIC TRAINING.
Ari Kiev and Martin B. Giffen (Wilford Hall USAF Hosp., Dept. of Psychiat., Lackland AFB, Tex.).
American Journal of Psychiatry, vol. 122, Aug. 1965, p. 184–188.

Basic military training is one of the few planned experiences in our society that exposes late adolescents to a rapid series of physical as well as psychological stresses, and which consciously attempts to introduce changes in orientation and values. This paper examines some of the consistent patterns of stress present in basic military training in the US Air Force and some of the clinical features demonstrated by a group of 220 airmen hospitalized for acute psychiatric breakdown during such training. The factors making for poor adaptation are examined and the need for considering general coping mechanisms as opposed to conventional diagnostic categories is considered.

A65-82226
POTENTIAL RESPONSE IN VARIOUS CORTICAL STRUCTURES IN THE COURSE OF FORMATION OF FOOD CONDITIONED REFLEXES TO ACOUSTIC AND PHOTIC STIMULI [ELEKTRICHESKIE REAKTSII V RAZLICHNYKH STRUKTURAKH KORY BOL'SHOGO MOZGA V PROTSESSE STANOVENIIA PISHCHEVYKH USLOVNYKH REFLEKSOV NA ZVUKOVYE I SVETOVYE RAZDRAZHITELI].
N. N. Liubimov (USSR, Acad. of Med. Sci., Inst. of Brain, Electrophysiol. Lab., Moscow).
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 15, Jul.–Aug. 1965, p. 585–593. 15 refs. In Russian.

Electrophysiological study of the formation of food conditioned reflexes, depending on the nature of conditioned (acoustic and photic) stimuli, was carried out on four dogs with electrodes implanted in different structures of the cerebral cortex. In the period of generalization of conditioned reflexes, excitation involves the motor analyzer during acoustic conditioned stimulation to a greater extent than during photic stimulation. As the reflexes become stable, the changes diminish, giving way to functional differences in the structures of the signal analyzers. Under the action of the acoustic conditioned stimulus, concentration or greater dispersion of excitation foci occurs in the structures of the acoustic analyzer as compared to the period of generalization. In the structures of the visual analyzer, the photic stimulus does not produce similar changes. A comparison of electrophysiological changes attending the elaboration of differentiation has revealed greater generalization and stability of differentiation inhibition caused by the acoustic than by the visual stimulus.

A65-82227
RESPONSES OF THE VISUAL SYSTEM TO OPTOKINETIC STIMULI [O REAKTSIIAKH ZRITEL'NOI SISTEMY NA OPTOKINETICHESKIE RAZDRAZHITELI].
V. P. Neverov (USSR, Acad. of Sci., I. P. Pavlov Inst. of Physiol., Leningrad).
Zhurnal Vysshei Nervuoi Deiatel'nosti, vol. 15, Jul.–Aug. 1965, p. 733–738. 16 refs. In Russian.

Optokinetic nystagmus (OKN) evoked by optokinetic stimulation of different frequencies was investigated in rabbits. At the rates of rotation of a striped cylinder, ranging from 1 to 6 r./min., there was a phase of driving in OKN (at a frequency of 22 to 55 stripes per minute) as well as a phase of rhythm transformation (at a frequency of 99 to 132 stripes per min.). Changes in the OKN amplitude were characterized by a phase of linear increase (in the range of 1 to 2.5 r./min. and a saturation phase (in the range of 2.5 to 6 r./min.). A new phenomenon, a reversible postoptokinetic nystagmus (RPN), is described, which emerges following a prolonged optokinetic stimulation, with complete elemination of vision (dark room, dark screen). RPN proceeds in the direction opposite the preceding OKN, and is a manifestation of automatic activity of the brain centers. A comparison of the maximum frequency of RPN and OKN (in the phase of rhythm transformation) leads to the conclusion that with an increasing frequency of band sequence, the OKN rhythm is transformed by the brain centers.

A65-82228
ON THE FUNCTIONAL CAPACITY OF HEART IN EXPERIMENTAL HYPOKALEMIA IN MAN [ZUR LEISTUNGSFAHIGKEIT DES HERZENS UNTER EXPERIMENTELLER HYPOKALIAMIE BEIM MENSCHEN].
M. Kaltenbach (Frankfurt am Main, II. Med. Klin. und Poliklin., West Germany).
Zeitschrift fur Kreislaufforschung, vol. 54, Mar. 1965, p. 221–226. 8 refs. In German.

Serum potassium was lowered in three healthy subjects by diuretic agents from 4.15 to 2.76 mEq./1 Total potassium level and erythrocyte potassium also decreased but to a lesser extent. The electrocardiogram showed typical signs of hypokalemia. Mechanical systole was shortened by 0.02–0.03 sec. Functional tests revealed no significant differences in hypokalemia and normality, i.e. no impairment of contractile efficiency reserves of the heart.

A65-82229
THE RESULTS OF QUANTITATIVE MEASUREMENTS OF CIRCULATION OF CALF MUSCULATURE IN MAN [ERGEBNISSE QUANTITATIVER DURCHBLUTUNGSMESSUNGEN DER WADENMUSKULATUR DES MENSCHEN].
H. Broghammer and W. Schroeder (Frankfurt am Main U., Inst. fur Animalische Psychol., und Chir. Klin., West Germany).
Zeitschrift fur Kreislaufforschung, vol. 54, Mar. 1965, p. 230–235. 15 refs. In German.

Circulation through the musculature of the lower leg was measured in 47 patients with healthy circulatory systems. The method was modification of the venous occlusion plethysmography (Schroeder, 1963). The mean value of various determinations amounted to 1.85 ml./min./100 ml. tissue, with a range of 0.43 ml. to 8.87 ml.

A65-82230
TESTING OF VISUAL ACUITY AND ITS RELIABILITY [DIE BESTIMMUNG DER SEHSCHARFE UND IHRE REPRODUZIERARKEIT].
H. Schober and H. Minker (Munich U., Inst. fur Med. Optik, West Germany).
Klinische Monatsblatter fur Augenheilkunde, vol. 146, Mar. 1965, p. 210–216. 7 refs. In German.

In order to achieve the accuracy in the determination of visual acuity required for evaluation, the authors describe 8 factors which influence the result and present numeric values about the effect of these factors. Requirements are mentioned which shall reduce the measuring error to a minimum and which concern luminous density, the contrast, the surrounding field and the category and arrangement of optotypes. As criterium for the recognizability of a line the authors do not suggest recognition of all optotypes in this line; they rather recommend the recognizability of three quarters of all optotypes which correspond to a certain vision.

A65-82231
SOME STIMULUS DIMENSIONS OF ROTATING SPIRALS.
Thomas R. Scott (Veterans Admin. Hosp., Columbia, S. C.) and J. H. Noland (S. C.; U., Columbia).
Psychological Review, vol. 72, Sep. 1965, p. 344–357. 28 refs.

The perceptible motion of rotation spiral lines can be analyzed into three components: motion normal to the line, rotational motion, and radial motion. General equations for these three components have been derived. Specific formulas for finding the three components for Archimedes, logarithmic, and hyperbolic spirals have been given in terms of distance from the center, speed of rotation, and the constants associated with these spirals. In addition, three "special" spirals have been derived which have respectively, the properties that the normal, radial, and rotational motions are constant for all distances from the center of rotation greater than a minimum distance. Possible applications have been suggested.

A65-82232
PULMONARY VASCULAR CHANGES WITH CHRONIC UNILATERAL PULMONARY HYPOXIA.
Richard L. Naeye (Vt. U., Coll. of Med., Dept. of Pathol., Burlington).
Circulation Research, vol. 17, Aug. 1965, p 160–167. 17 refs.
Grant Natl. Heart Inst. HE-06469-04.

Differentiation of effects of chronic hypoxia from those of hypertension in pulmonary vessels is attempted by experiments in which one lung is chronically hypoventilated. One main stem bronchus was ligated in each of 12 adult, mongrel dogs. A similar procedure was undertaken on three calves. Two one-month-old human infants with unilateral diaphragmatic defects were also studied. In each case the lung on the affected side was atelectatic and the contralateral lung was expanded. Both smooth muscle hyperplasia and hypertrophy developed in small arteries of the poorly ventilated human infant and dog lungs. In the calves, muscular hyperplasia and hypertrophy developed in the small pulmonary veins of the hypoxia of the hypoxic lungs. Since arterial pressures and pulmonary arterial oxygen saturation were presumably identical in hypoxic and control lungs, changes in vascular muscle are postulated to be the result of altered oxygen tension of the surrounding alveolar gas.

A65-82233
REINTERPRETATION OF ONE FORM OF BACKWARD AND FORWARD MASKING IN VISUAL PERCEPTION.
Charles W. Eriksen and James F. Collins (Ill. U., Urbana).
Journal of Experimental Psychology, vol. 70, Oct. 1965, p. 343–351. 19 refs.
Grant PHS MH-1206.

Two experiments were performed on the masking effect of a ring stimulus upon forced-choice recognition of letter forms when the ring was presented concurrently with the form or preceding or following the form at delay intervals up to 250 msec. Ten subjects were employed in Experiment I (backward masking) and ten in Experiment II (forward masking). Masking effects on recognition accuracy were obtained for delay intervals as long as 80 msec. Maximum masking occurred when ring and form occurred concurrently. The masking functions obtained for forward and backward masking appeared highly similar if not identical. An interpretation was suggested in terms of visual perceptual persistence where masking is due to the greater difficulty of perceiving a form surrounded by a black ring. Possible perceptual mechanisms for the persistence were considered.

A65-82234
SPATIAL AND TEMPORAL DETERMINANTS OF VISUAL BACKWARD MASKING.
Robert W. Sekuler (Brown U., Providence, R. I.)
Journal of Experimental Psychology, vol. 70, Oct. 1965, p. 401-406. 13 refs.
Grant NSF G-14314; and PHS supported research.

Duration thresholds were obtained for a single test stripe succeeded by a masking pattern of alternating dark and bright bars delivered to the same retinal region. The effect of the angle (alpha) between test stripe and masking contours was studied in conjunction with both vertical and horizontal test stripes. With either of the test-stripe orientations duration threshold decreased as alpha increased from 0° to 90°. In another experiment both alpha and the interstimulus interval (ISI) were varied. The effectiveness of alpha as a determinant of masking seemed to be restricted to ISI below 60 msec.

A65-82235
SHORT-TERM ADAPTIVE PROCESSES DURING PERCEPTION OF THE VERTICAL VIEWED AS SPECIAL CASES OF GENERAL PSYCHOPHYSICAL TRANSFORMATION PROCESSES (PRELIMINARY REPORT ON FORMULATION OF A MODEL) [KURZFRISTIGE ADAPTIVE PROZESSE BEI DER WAHRNEHMUNG DER VERTIKALEN ALS SPEZIALFALLE ALLGEMEINER PSYCHOPHYSISCHER TRANSFORMATIONSPROZESSE (VORLAUFIGE MITTEILUNG EINES MODELLANSATZES)].
H.-G. Geissler (Humboldt-U., Inst. für Psychol., Berlin, West Germany).
Zeitschrift für Psychologie, vol. 170, May 1965, p. 201-210. 5 refs. In German.

Perception of the vertical within the area of spatial orientation is discussed in terms of a linear feedback regulation system. A psychophysical model is proposed which assumes a one dimensional process; it may be applied also under conditions that are less than optimal; and it is a linear function of the various input variables. Aubert's phenomenon (deviation in adjusting the subjective vertical in a dark room at a tilted head or body position) is used to illustrate the application of this model.

A65-82236
CHANGES IN COMPOSITION AND CONCENTRATION OF PIGMENTS IN BLUE-GREEN ALGAE IN THE PRESENCE OF ADDITIONAL CARBON AND NITROGEN SOURCES [IZMENENIIA SOSTAVA I SODERZHANIIA PIGMENTOV SINE-ZELENYKH VODOROSLEI V PRISUTSTVII DOPOLNITEL'NYKH ISTOCHNIKOV UGLERODA I AZOTA.]
M. V. Gusev and E. I. Vasil'kova.
Mikrobiologiia, vol. 34, May-Jun. 1965, p. 477-482. 9 refs. In Russian.

In the cells of the blue-green alga Anabaena variabilis grown in a medium with additional sources of carbon (glucose, ethanol or acetate) and nitrogen (nitrate of ammonium salts), phycoerythrin appeared even at light intensities which were not sufficient for production of this pigment in a mineral medium without additional carbon and nitrogen sources. No changes occurred in similar cases in the composition of the pigments of Hapalosiphon fontinalis. In the presence of additional carbon and nitrogen sources, the following changes were noted in the content and concentration of the pigments in Anabaena variabilis and Hapalosiphon fontinalis: (1) in the presence of nitrate the content of all pigments diminished, (2) in the presence of ammonium the content of bilichromoproteins and chlorophyll a as well as the bilichromoprotein chlorophyll a ratio increased, and (3) in the presence of additional carbon compounds the content of chlorophyll a increased as well as that of bilichromoproteins and of the bilichromoproteins chlorophyll a ratio. Upon addition of carbon compounds the carotenoid chlorophyll a diminished in Anabaena variabilis but not in Hapalosiphon fontinalis.

A65-82237
AUDIOMETRIC MEASURES OF AUDITORY CAPACITY [MESURES AUDIOMETRIQUES DE LA CAPACITE AUDITIVE].
L. Pimonow (C.N.E.T., Paris, France) and R. Mazeas (C.H.U., Clin. O.-R.-L., Rennes, France).
Annales Oto-Laryngologie, vol. 82, Jan.-Feb. 1965, p. 37-53. 34 refs. In French.

Following a brief review and critique of the literature dealing with the audiometric measurement of auditory capacity, a description is given of a new principle and technique for measuring auditory capacity in normal and deaf persons. The change of audiometric frequency or level with this method is made manually at different intervals on a standard potentiometer to induce a variation of $\Delta I/I$ in decibels, or to measure ΔF on a variable condenser of the BF generator. The deaf subject can indicate the frequency or amplitude variation perceived over earphones by a hand signal. To measure $\Delta I/I$ this method presents no difficulties. To measure $\Delta F/F$ two sensations must be superimposed: variation of tonality (ΔF), and sensitivity variation to sound level (ΔI) as a function of frequency. The technical difficulties of this method are outlined. Equations and discussion are presented for the aural perception of information and of reaction times to a variation of amplitude ($\Delta \tau_A$) or to frequency ($\Delta \tau_F$). The problem of bands of critical frequency of the ear is also considered.

A65-82238
UPTAKE OF CATECHOLAMINES BY THE HEARTS OF RABBITS TREATED WITH SEGONTIN.
B. R. Mackenna (Karolinska Inst., Dept of Physiol., Stockholm, Sweden).
Acta Physiologica Scandinavica, vol. 63, Apr. 1965, p. 413-422. 27 refs.
Contract AF EOAR 64-31 and Swedish Med. Res. Council supported research.

A single intravenous injection of 8 mg./kg. of Segontin (N-(3-Phenyl-propyl-(2')-1,1-diphenyl-propyl-(3)-amine)) caused a fall in the noradrenaline (NA) content of rabbit hearts to less than 10 per cent of their normal value in about 2 hrs. After 4 hrs. the tissue content of NA started to rise again and after 24 hrs. it had recovered to about one-third of its normal value. An intramuscular injection of 0.75 mg./kg. NA 2 hrs. after Segontin treatment, caused a temporary rise in the NA content of the heart to the normal value. NA was increased in the coarse particle fraction, the high speed sediment and in the particle free supernatant fraction of the heart after homogenization indicating that exogenous NA is temporarily filling the available storage sites. An intravenous infusion of NA (10 μ g./kg./min. for 20 min.) caused an uptake of NA into the heart previously depleted by Segontin, followed by a rapid and then slower release of the NA. The uptake of l-NA and d-NA and also of l-Adrenaline and d-Adrenaline showed stereochemical specificity in favor of the l-isomers. Phenoxybenzamine blocked the uptake of NA into the heart of rabbits depleted by Segontin, whereas dichlorisoproterenol (DCI) had only a small blocking effect. Phenoxybenzamine by itself reduced the NA content of all fractions of the heart.

A65-82239
AIR POLLUTION EVALUATION OF TITAN II TEST FIRINGS.
Philip Diamond and Hamilton K. Johnson (Reg. Environ. Health Lab., McClellan AFB, Calif.)
American Industrial Hygiene Association Journal, vol. 26, Jul.-Aug. 1965, p. 419-422. 5 refs.

Atmospheric sampling was made at the site of Titan II test firings to determine the downwind personnel hazard from exhaust gases. Components of these gases tested include nitrogen dioxide, hydrazine, and unsymmetrical dimethylhydrazine. Air samples taken at 300 and 700 ft. from the test stand indicate that there is no downwind hazard to personnel from any of the gas constituents.

A65-82240
SITE OF S-REACTIVE PROTEIN FORMATION IN IRRADIATION DAMAGE [O MESTE OBRAZOVANIIA S-REAKTIVNOGO PROTEINA PRI LUCHEVOM PORAZHENII].
R. V. Petrov, V. M. Zemskov, and P.M. Pashinin.
Radiobiologiia, vol. 5, 1965, p. 511-513. 7 refs. In Russian.

Irradiation of rabbits by gamma rays (800-1000 r) caused appearance of S-reactive protein in peripheral blood 6-15 hrs. after exposure. Animals, in whose blood this protein was demonstrated sooner, died of shock. Simultaneously with its appearance in the peripheral blood, the protein was found in the vena cava and in the portal and hepatic veins. In the circulating blood the protein was found over an hour later after its detection in the three veins. The retarded appearance of S-reactive protein in the general blood circulation may indicate the absence of a specific site of its formation; but the protein is not formed in the lungs or destroyed there. This is indicated by its absence in the upper aorta.

A65-82241
MORPHOLOGICAL CHANGES IN THE DOG'S NERVOUS SYSTEM INDUCED BY HIGH ENERGY PROTONS [MORFOLOGICHESKIE IZMENENIIA NERVNOI SISTEMY SOBAK PRI DEISTVII PROTONOV VYSOKIKH ENERGII].
A. F. Bibikova and B. I. Lebedev.
Radiobiologiia, vol. 5, 1965, p. 562-565. 10 refs. In Russian.

In dogs who died or were sacrificed during acute radiation sicknes—the result of a single exposure to 510 Mev protons—the distrophic damage of the nervous system was similar to that observed in cases of radiation effects after X-ray or gamma radiation exposure. Intercranial and subarachnoid hemorrhages, however, were noted more often after proton exposure. Repeated exposures to the same energy protons resulted in greater damage to

the cerebral circulation, increasing with each additional exposure. The type of damage to the cerebral vessels and the glial structures indicated a direct disturbance in the trophics of the nervous system.

A65-82242
PROBLEM OF THE INFLUENCE OF BETA-RAYS OF C^{14} ON CHLORELLA BY GROWING IT IN A MEDIUM WITH C^{14} CARBONATES [K VOPROSU O DEISTVII BETA–CHASTITS C^{14} NA KHLORELLU PRI VYRASHCHIVANII EE V SREDE S C^{14}-KARBONATAMI].
V. L. Karpov and B. V. Filippov (A. A. Zhdanov Leningrad U., Biol. Inst., USSR).
Radiobiologiia, vol. 5, 1965, p. 580–583. 10 refs. In Russian.

Chlorella pyrenoidosa was grown on a medium containing $C^{14}O_2$, in order to study the mechanisms of amino-acid synthesis. It is known that radioactivity may supress mitosis and therefore decrease algae growth. The author studied the degree of radioactivity which would permit maximal growth. The results showed that, in order to grow Chlorella in the presence of a radioacrive carbon, the only effect which should be considered is the ionizing effect of the beta particles. Other factors connected with carbon radioactivity, when applied in large concentration to a culture medium, do not influence the rate of growth.

A65-82243
THE EFFECT OF HYDROGEN FLUORIDE ON THE CENTRAL NERVOUS SYSTEM IN AN EXPERIMENT [VLIIANIE FTORISTOGO VODORODA NA TSENTRAL'NUIU NERVNUIU SISTEMU V EKSPERIMENTE].
M. S. Sadilova, K. P. Seliankina, and O. K. Shturkina (Sverdlovsk Inst. of Hyg. Labor and Prof. Pathol. and Sverdlovsk Med. Inst., USSR).
Gigiena i Sanitariia, vol. 30, May 1965, p. 11–15. In Russian.

Rats were exposed to a constant concentration of hydrogen fluoride gas in a closed chamber in order to determine the threshold value of smell and the reflex action on the functional state of the cerebral cortex by means of adaptometry. It was found that both threshold values were at the level of 0.03 mg. Continuous exposure of the animals for a period of five months at hydrogen fluoride concentration of 0.10–0.03 mg./$m.^3$ produced functional changes in the central nervous system, as indicated by conditioned reflexes and chronaximetry. Neurohistological examinations made at the end of the exposure period disclosed lesions of the intereural connections and nerve cells in the area of motor and sensory analyzers in the animals exposed to 0.10 mg/$m.^3$ concentration of hydrogen fluoride. Concentrations of 0.01 mg./$m.^3$ produced no changes. The conclusion is that maximum average concentration of hydrogen fluoride in the atmospheric air should not exceed 0.01 mg./$m.^3$.

A65-82244
GENERAL IMMUNOLOGICAL RESPONSE AND DISEASE INCIDENCE IN WORKERS EXPOSED TO THE ACTION OF CARBON BISULPHIDE [SOSTOIANIE OBSHCHEI IMMUNOLOGICHESKOI REAKTIVNOSTI ORGANIZMA I ZABOLEVAEMOST' RABOCHIKH PRI VOZDEISTVII SEROUGLERODA].
L. M. Kashin (Ukrainian Inst. of Perfect Physicians, Kharkov, SSR).
Gigiena i Sanitariia, vol. 30, Jun. 1965, p. 23–26. 5 refs. In Russian.

An attempt was made to determine the effect of small concentrations of carbon bisulfide on the immunological reactivity of the body and on morbidity with temporary disability in workers in a rayon factory. A drop in general immunological reactivity and a rise in morbidity rate were observed in workers exposed to the action of carbon bisulfide at concentrations both above and below the maximum permissible level (10 mg./$m.^3$). A relationship was demonstrated between the state of general immunological reactivity and that of morbidity with temporary disability: the morbidity rate dropped with a rise of body reactivity.

A65-82245
EFFECT OF COMBINED ACTION OF NOISE AND VIBRATION ON VIBRATION SENSITIVITY IN ADOLESCENTS [VLIIANIE SOVMESTNOGO DEISTVIIA SHUMA I VIBRATSII NA VIBRATSIONNUIU CHUVSTVITEL'NOST' PODROSTKOV].
A. I. Tsysar' (USSR, Acad. of Med. Sci., Inst. of Hyg. of Childhood and Adolescents, Moscow).
Gigiena i Sanitariia, vol. 30, Jun. 1965, p. 30–36. 11 refs. In Russian.

The authors studied the effect produced on the vibration sensitivity of adolescents by work with electric and pneumatic instruments and the extent of the effect produced by various parameters of vibration. The adolescents presented a high sensitivity to the action of noise and vibration factors: a rise in the threshold value of the vibration sensitivity was noted in case of a comparably short service record and short-term work with the instruments. In the course of a working day, changes in vibration sensitivity were noted to occur mainly in the way of insignificant and moderate rises of its threshold values, that are evidently connected with changes in the functional state of the vibration analyzer.

A65-82246
ELECTROPHYSIOLOGICAL INVESTIGATION OF CERTAIN SUBCORTICAL FORMATIONS IN HUMANS WITH IMPLANTED ELECTRODES [ELEKTROFIZIOLOGICHESKOE ISSLEDOVANIE NEKOTORYKH PODKORKOVYKH OBRAZOVANII CHELOVEKA S KHRONICHESKI VZHIVLENNYMI ELEKTRODAMI].
T. G. Urmancheeva and I. N. D'iakonova (USSR, Acad. of Med. Sci., Inst. of Expti. Pathol. and Therapy, Lab. of Physiol. of Higher Nervous Activity, Sukhumi; and Med. Inst., Clin. of Nervous Diseases and Neurosurg., Rostov-on-Don).
Fiziologicheskii Zhurnal SSSR, vol. 51, Aug. 1965, p. 909–917. 23 refs. In Russian.

In patients with electrodes implanted into subcortical areas, frequency of the subcortical potentials were found to be primarily 4–6 per second. Frequencies of 2–3, 8–12, and 8–24 per second were also demonstrated. The amplitude varied from 25 to 70 microvolts. Stimulation of globus pallidus and the ventro-lateral nucleus produced definite motor activity and awareness of stress, followed by functional changes. This effect was reflected in desynchronization of potential, a decrease in the amplitude, and an appearance of slow waves. These results indicated an involvement of not only the stimulated areas but also the adjacent formations, which are functionally connected.

A65-82247
SIGNIFICANCE OF MOTOR TASK IN RHYTHMICAL WORK INVOLVING DIFFERENT STRAIN [ZNACHENIE DVIGATEL'NOI ZADACHI PRI RITMICHESKOI RABOTE RAZLICHNOI TIAZHESTI].
D. P. Bukreeva and L. I. Peresleni (RSFSR Acad. of Paedagogic Sci., Sci.-Res. Inst. of Phys. Educ. and School Hyg., Lab. of Physiol. of Labor, Moscow).
Fiziologicheskii Zhurnal SSSR, vol. 51, Aug. 1965, p. 1005–1011. 7 refs. In Russian.

Experiments with human subjects showed that in rhythmical motor tasks, such as wielding a hammer, the longest period in formulating a strike is expressed in lifting the object, and the plateau phase. The period of a pause and extension was not significant. This was true for a small weight (150 g.) and a large weight (1570 g.) However, with the increase of the weight head the pause duration decreased. At low frequency of strike (30 times a minute) a variation of components of this motor task was noted. With the increase in the strike frequency the motions became more uniform.

A65-82248
DEPENDENCE OF THE PRODUCTIVITY AND CHEMICAL COMPOSITION OF SOME GREEN ALGAE ON NITROGEN NUTRITION CONDITIONS [ZAVISIMOST' PRODUKTIVNOSTI I KHIMICHESKOGO SOSTAVA NEKOTORYKH SHTAMMOV ZELENYKH VODOROSLEI OT AZOTISTOGO PITANIIA].
V. IAska (Estonian SSR, Acad. of Sci., Inst. of Zool. and Botany, Tallinn).
Eesti Nsv Teaduste Akadeemia Toimetised, Bioloogiline Seeria, vol. 14, 1965, p. 49–65. 15 refs. In Russian.

When grown on an adequate supply of nitrogen, green algae accumulated preferentially proteins or carbohydrates depending on the algal strain. Reduction of the amount of nitrogen supplied resulted in a decrease of protein content in all the investigated green algae up to 7–10%, and in a shift of the metabolic pattern in the direction of a biosynthesis of carbohydrates or lipids depending on the algal strain. Owing to a limited supply of nitrogen, all the three strains of Scenedesmus accumulated carbohydrates before the yields dropped. The cells of Chloroccum botryoides, however, accumulated considerable quantities of fatty material under conditions of nitrogen starvation only when photosynthetic productivity had already dropped. The results of the studies indicate that the metabolic pattern of the unicellular green algae is shifted towards the biosynthesis of protein, carbohydrates or lipids, depending on the species or strain of the algae as well as on nitrogen nutrition conditions.

A65-82249
CORRELATION BETWEEN KETONE BODY AND FREE FATTY ACID CONCENTRATIONS IN THE PLASMA DURING EARLY STARVATION IN MAN.
P. G. Hanson, R. E. Johnson, and D. S. Zaharko (Ill. U., Dept. of Physiol. and Biophys., Human Environ. Res. Unit, Urbana).
Metabolism Clinical and Experimental, vol. 14, Oct. 1965, p. 1037–1040. 7 refs.
Contract DA-49-193-MD-2222.

During the first 2 days of starvation in healthy young adults there is an increase in free fatty acids (FFA) and ketone bodies in the blood plasma. A plot of the logarithm of ketone body concentration as a function of FFA concentration yields a highly significant linear regression.

A65-82250
EFFECT OF EXERCISE AND ISOPROTERENOL ON THE CARDIOVASCULAR DYNAMICS IN COMPLETE HEART BLOCK AT VARIOUS HEART RATES.
Alberto Benchimol, Teh-lu Wu, and Marvin S. Liggett (Scripps Clin. and Res. Found., Inst. for Cardiopulmonary Diseases, La Jolla, Calif.)
American Heart Journal, vol. 70, Sep. 1965, p. 337–347. 26 refs.
Grants NIH HE-07983-02 and HE-5513-03; and Timken-Sturgis Found. supported research.

The effect of exercise on the cardiac functions was studied in 4 patients ith complete heart block. The results indicate that the cardiac output and the roke volume rise during exercise to a significant degree in the absence of ıy change in the ventricular rate. Furthermore, the rise in the stroke volume ıring exercise is proportional to the heart rate, with the maximal increase this parameter obtained for the heart rate of 50 per minute. Infusion of oproterenol at various fixed rates reproduced some of the responses obtained ıring exercise. The cardiac output and the stroke volume rose during administration of the drug. The maximal rise in these parameters was obtained r the rates of 70 and 90 per minute. It is concluded, therefore that the roke volume and the peripheral resistance are powerful regulatory mechıisms of the cardiac output in conditions in which the heart rate cannot be creased. Furthermore, a better hemodynamic result is provided by higher tes than by slower rates of pacing.

65-82251
N THE TOLERANCE THRESHOLD FOR ACOUSTICAL EFFECTS {UBER IE TOLERANZGRENZE BEI AKUSTISCHEN EINWIRKUNGEN}.
iedrich Pfander (St. Joseph-Stiftes, Hals-Nasen-Ohrenäbt., Bremen, West ermany).
Jordwestdeutsche Vereinigung der Hals-, Nasen- und Ohrenarzte, 47th eeting, Bremen, West Germany, Oct. 16–18, 1964)
NO, vol. 13, Jan. 1965, p. 27–28. In German.

Evaluation of the tolerance limits of acoustical stimulation has to take the llowing factors into account: (1) sound pressure, (2) exposure, and (3) reıvery factor in the interval between acoustic events. The tolerance limits for :oustic stimulation are 90 db. for an 8 hr. exposure. As the exposure time shortened the upper loudness threshold decreases to a tolerance of 165 db. 3 msec. continuous exposure. With suitable ear defenders the tolerance nits may be increased to 190 db. at 3 msec. Hearing loss ensues whenever ese limits are exceeded. Experiments on blast trauma suggest that within ese tolerance limits acoustical stimulation does not cause permanent damge.

65-82252
LECTROCARDIOGRAPHIC OBSERVATION OF 493 RESIDENTS LIVING T HIGH ALTITUDE (10,150 FEET).
ay Pryor, Walt F. Weaver, and S. Gilbert Blount, Jr. (Colo. U., Med. Center, ept. of Med., Div. of Cardiol., Denver).
merican Journal of Cardiology, vol. 16, Oct. 1965, p. 494–499. 15 refs.
rant Natl. Heart Inst. H-1208(C9).

Clinical cardiovascular evaluations were performed on 508 school chil:en living at 10,150 ft. in Leadville, Colo. The electrocardiograms of 493 of ese children were analyzed and the findings were compared with electroırdiographic observations on similar residents at various altitudes. Thirty :r cent of the subjects had electrocardiographic findings suggestive of right entricular enlargement. The average mean AQRS of the entire group was ıore rightward than that of children of similar age living at 5,280 feet and at :a level, and less rightward than that of teenage children living at 14,900 ft. lectrocardiographic variability is an important part of the clinical evaluation : the healthy teenage subject living at high altitude.

65-82253
FFECTS OF LOWER BODY NEGATIVE PRESSURE ON THE CARDIOASCULAR SYSTEM.
aul M. Stevens and Lawrence E. Lamb (USAF School of Aerospace Med., erospace Med. Sci. Div., Internal Med. Dept., Brooks AFB, Tex.)
merican Journal of Cardiology, vol. 16, Oct. 1965, p. 506–515. 24 refs.

Application of negative pressures ranging between −25 and −80mm. Hg. ı the lower half of the supine body produces cardiovascular changes similar venesection and upright tilting. The heart rate increases between 13 and 7 per cent; central venous pressure decreases by 3 to 6 mm. Hg; cardiac dex falls by 20 to 42 per cent; and stroke volume decreases by 28 to 64 per ent. In spite of these changes, systolic and pulse pressures are often well aintained. Calculated peripheral reisitance increased significantly between 4 and 34% during lower body negative pressure; however, due to great dividual variability, no significant difference was observed among the varus negative pressures. Syncope very similar to that observed secondary to her vasodepressor stimuli is noted with increasing frequency as the amount negative pressure increased, i.e., 100% at −80mm. Hg., 70% at −60, 58% : −40, and none at −25. Compensatory mechanisms mediated neurogenically aintain adequate circulation to vital organs. The possible origins and conols of these mechanisms are discussed.

65-82254
TRIOVENTRICULAR CONDUCTION IN MAN: EFFECT OF RATE, EXERISE, ISOPROTERENOL AND ATROPINE ON THE P-R INTERVAL.
ohn W. Lister, Emanuel Stein, Bernard D. Kosowsky, Sun Hing Lau, and nthony N. Damato (Public Health Serv. Hosp., Cardiopulmonary Lab., taten Island, N. Y.)
merican Journal of Cardiology, vol. 16, Oct. 1965, p. 516–523. 18 refs.
rant PHS HE 09156-01.

Atrioventricular (A-V) conduction was studied in 14 patients. A bipolar electrode catheter was placed in the right atrium and the heart rate was controlled by atrial pacing. Increases in the sinus heart rate were associated with decreases in A-V conduction time. When the heart rate was increased by atrial pacing, there were progressive increases in A-V conduction time. Exercise, isoproterenol and atropine shortened A-V conduction time. In those cases where A-V conduction block occurred during atrial pacing, there was a 1:1 A-V response during exercise at the same paced heart rate. Stimuli which increase the rate of discharge of the sinus pacemaker also enhance atrioventricular conduction.

A65-82255
BRAIN MECHANISMS AND PERCEPTION.
W. Grey Walter.
British Journal of Physiological Optics, vol. 22, 1965, p. 1–9. 9 refs.

The most important advance in brain mechanisms and perception is the experimentally indicated knowledge that responses to sensory stimulation involve not only the specific sensory projection areas, but also various areas of frontal lobes. The technique of implantation of minute electrodes into the subdural areas permits identification of brain responses smaller than the continuous background activity, which otherwise swamps the most significant features. The most interesting finding by the author is the appearance of a new electro-cortical effect, a wave of negative change, which begins immediately after the conditional response and extends up to the moment of the response to the imperative stimulus. This secondary negative wave is almost invisible with the conventional bipolar montage and had not been noticed before. The author called it the contingent Negative Variation, or the Expectancy Wave. It reflects the subjective probability of the triple association: conditional stimulus–imperative stimulus–operant response. The author describes the correlations between the Expectancy Wave and the psychological situation in human adults, and the physiological processes reflected in the Expectancy Wave.

A65-82256
CIRCADIAN CYCLES IN MAN: THE DREAM CYCLES.
Louis H. Nahum (Conn. State Med. Soc., New Haven).
Connecticut Medicine, vol. 29, Sep. 1965, p. 626–630. 14 refs.

Only until recently the knowledge about the dream state (D-state) had been derived from psychoanalytical studies. Now it has been established that there are four or five periods during an average night's sleep during which the person sees dreams. These periods are characterized by rapid eye movements, which resemble the waking state. This phenomenon is found not only in humans but in animals, which were subjected to such studies. During the D-state many autonomic functions are activated, such as changes in pulse rate and blood pressure, as opposed to the non-dreaming sleep during which these parameters remain at a steady low level. The results of experiments of transection of the brain show that the D-state is initiated by a center in the pons, one of the most primitive parts of the brain. The pathways whereby this center transmits impulses upward to achieve activation of the cortex, and downward to achieve inhibition of muscle potential and decreased sensitivity of the motor neurons, have as yet not been established. Dream deprivation leads to disturbances in psychic and physical state, which indicates a need for dreaming as a part of the circadian cycle in man.

A65-82257
AN ANALYSIS OF THE SATIATION-FATIGUE MECHANISM OF FIGURAL AFTER-EFFECTS.
Leo Ganz (Calif. U., Riverside) and Ross H. Day (Sydney U., Australia).
American Journal of Psychology, vol. 78, Sep. 1965, p. 345–361. 20 refs.
PHS supported research.

The prolonged inspection of visual figures has been reported to have the following two consequences: (1) visual objects are displaced away from the region of inspection; (2) visual objects are more difficult to detect in this region. The hypothetical constructs employed in work on figural after-effects suggest specific relationships between these two consequences of prolonged fixation. In the present experiments, the displacement and detection of test-figures at a variety of distances from the inspection figure were measured. The results indicate that displacements sometimes occur toward areas of heightened detection-thresholds. Furthermore, displacements occur from one area to another, which do not differ with respect to their detection-thresholds. Finally, when a dichoptic presentation is employed, displacements can be induced without concomitant threshold-changes. It is concluded that figural after-effects probably are not due to the displacement of figures away from regions of greater neural fatigue or satiation.

A65-82258
FURTHER OBSERVATIONS ON THE NATURE OF EFFECTIVE BINOCULAR DISPARITIES.
Lloyd Kaufman and Colin Pitblado (Sperry Rand Res. Center, Sudbury, Mass.)
American Journal of Psychology, vol. 78, Sep. 1965, p. 379–391. 13 refs.
Contract DA 49-193-MD-2654.

An effort is made to trace the outlines of the stimulus-conditions important for stereopsis. The observations suggest that relative brightness disparities are both necessary and sufficient stimuli for stereopsis. Chromatic

color may be a second dimension relative to stereopsis. Contour was shown to be irrelevant for stereopsis. Rivalry is viewed as a phenomenon which is relatively independent of stereopsis. It may reflect processing performed by the nervous system to ascertain depth relations.

A65-82259
RECOVERY OF FOVEAL ACUITY FOLLOWING EXPOSURE TO VARIOUS INTENSITIES AND DURATIONS OF LIGHT.
Jo Ann S. Kinney and Mary M. Connors (U. S. Naval Med. Res. Lab., Groton, Conn.)
American Journal of Psychology, vol. 78, Sep. 1965, p. 432–440. 13 refs.

The study was designed to measure the effect of various durations and intensities of light on the acuity-threshold of the dark-adapted fovea, by determining the time necessary to readapt following these exposures. The adapting lights were always presented foveally and varied in brightness from 0.36 to 3,000 ft.-L., and in duration from 1 to 45 sec. The resulting families of dark-adaptation curves show that the times necessary to readapt to the previously determined acuity threshold vary systematically with the intensity and duration of exposure, from essentially zero for dim, brief lights to a maximum of about 5 min. for the longer, brighter ones. A most interesting aspect of the data is that the product of intensity (I) and time (T) gives a constant effect. When readaptation-time if plotted against I x T, a single curve results, which quite adequately fits the data-points.

A65-82260
THE RELATION BETWEEN PULSE-TO-CYCLE FRACTION AND CFF.
C. I. Thompson, F. G. Fidura, C. J. Rhoads, C. A. DeYoung, and B. L. Kintz.
American Journal of Psychology, vol. 78, Sep. 1965, p. 448–454. 8 refs.

Pulse-to-cycle fraction (PCF) crossings were obtained by varying flicker-frequency for nine combinations of PCF and intensity. After the crossing points were determined, the corresponding critical flicker-frequency and intensity-values were held constant while PCF was varied from 0.02–0.98. The majority of these series produced two flicker-to-fusion or fusion-to-flicker transitions, while three transitions occurred for three observers. Bartley's (1960) model provides a fairly accurate explanation of the retinal behavior involved.

A65-82261
A RELATION BETWEEN AROUSAL AND PERFORMANCE.
John J. Sherwood (Carleton Coll., Northfield, Minn.)
American Journal of Psychology, vol. 78, Sep. 1965, p. 461–465. 14 refs.

Two studies of an exploratory nature investigated the relation between level of arousal, as measured by reported rate of figure-reversals of the Necker cube, and performance, as measured by short-term retention in paired-associate learning. In the first experiment, performance was highest under conditions of high arousal and lowest under conditions of low arousal. The second experiment compared performance under different conditions of arousal for the same subject. Performance was lower under conditions of low arousal than under conditions of medium or high arousal. The validity of rate of figure-reversals as a measure of arousal received support from the finding that there was a significant correlation with the subject's reports of level of arousal. The evidence neither proves nor disproves the proposition from the activational theory that performance is most efficient at intermediate levels of arousal.

A65-82262
SOME CONDITIONS OF THE EFFECT OF RELATIVE SIZE ON PERCEIVED RELATIVE DISTANCE.
William Epstein and Samuel Franklin (Kan. U., Lawrence).
American Journal of Psychology, vol. 78, Sep. 1965, p. 466–470.
Grant PHS MH-4153.

Two experiments examined the conditions which govern the effect of relative size on relative distance. Two variables were studied: (1) size-ratio vs. absolute size-difference; and (2) shape similarity. It was found that variations in size-ratio are necessary to produce variations in perceived relative distance. Similarity of shape is unnecessary.

A65-82263
THE EFFECT OF OBSERVATIONAL TECHNIQUE ON BRIGHTNESS ENHANCEMENT.
Carroll M. Colgan (S. C. U., Columbia).
American Journal of Psychology, vol. 78, Sep. 1965, p. 471–475. 9 refs.

Using the method of adjustment, each of three groups of twelve subjects matched a steady light to a flickering light in terms of brightness for each of 17 different flash-rates. The groups differed in instructions. The maximal enhancement occurred at 4–5 c.p.s. for all three groups. There was greater enhancement in a group making its matches on the basis of the on period alone that in a group using both on- and off periods, or for a group given no special instruction.

A65-82264
FOVEAL AND PARAFOVEAL COLOR VISION.
K. H. Ruddock (Imp. Coll. of Sci., Phys. Dept., London, Great Britain).
Journal of the Optical Society of America, vol. 55, Sep. 1965, p. 1180.

Changes in observers' response to color mixtures with varied retinal location of the visual field were studied in macular pigmentation tests by comparing trichromatic matches of a white test field under 2° and 10° viewing conditions. An absorption curve for macular pigment was deduced from a comparison of foveal and parafoveal color matches. The absorption effect was up to 570 $m\mu$. Failure to see the polarization effect at wavelengths longer than 515 $m\mu$ may result because the pigment absorption is much reduced at longer wavelengths. All differences between foveal and parafoveal color matches must be due to macular pigmentation rather than to receptor variation because they occur or are absent at all wavelengths in different subjects. Color matches made with the matching field fixed at the central fovea, while the test field is moved across the fovea, could be used to investigate changes in the retinal receptor population.

A65-82265
CHROMATIC INDUCTION FROM PULSATING BLACK AND WHITE STIMULI.
Antonio M. Silvestri (Tech. Operations Res., Burlington, Mass.)
Journal of the Optical Society of America, vol. 55, Sep. 1965, p. 1182–1183.

Apparent color was induced by two stationary black and white fields illuminated by pulsating light. The induced colors appeared to be a function of the relative phase between the two sources and of the ratio of the pulsewidth-density products. The results of the experiments indicated that rotating disks are not necessary to induce color with black and white stimuli, and that the nature of these illusions is not limited to descriptive observation, but may be measured quantitatively. The time relations between the records are important because the repetition frequency is confined to a low value, less than the flicker fusion frequency. Despite this, color may be observed in one region while, simultaneously, another color is apparent in a second region, and no color is apparent in a third region. These colors remain steady, although the field scintillates.

A65-82266
BINOCULAR VISION: THE EFFECTS OF VERTICAL ACCOMMODATION AND THE MOIRE EFFECT.
Roger Hayward.
Journal of the Optical Society of America, vol. 55, Sep. 1965, p. 1185.

The effects of vertical accommodation and the moiré effect in binocular vision were studied by presentation of charts with stereo-pairs of drawings of two superimposed quadrilateral figures. When viewed separately, one quadrilateral figure appeared to pass under the other quadrilateral outline. When both figures were fused, the places where one was cut by the other, were not on the same level for the two eyes. A vertical accommodation was required to reconcile the discrepancy. When the same quadrilaterals were shown without the lines, where one would cross the other, the enclosed surface seemed to be bounded on all sides by lines, which curved out of the plane to connect the corners of both figures. When each figure was ruled with nonparallel lines, at the place of superimposition the binocular vision was presented with a moiré pattern.

A65-82267
INHIBITION AND THE TIME AND SPATIAL PATTERNS OF NEURAL ACTIVITY IN SENSORY PERCEPTION.
Georg von Békésy (Harvard U., Cambridge, Mass.)
Annals of Otology Rhinology and Laryngology, vol. 74, Jun. 1965, p. 445–462. 21 refs.
NIH and Am. Otol. Soc. supported research.

Sensations produced by a vibrator placed on the surface of the skin were compared with electrophysiological records of nervous discharges. The close agreement between the subjective and objective observations indicated that large areas stimulated by traveling waves along the surface of the skin are inhibited. Inhibition is a large phenomenon. Since the speed of the traveling waves is high, inhibition must be effective within a few milliseconds. It is shown that localization of a stimulus does occur in 1 msec. for hearing, vibratory stimulation, and even taste and smell. Localization, therefore, has priority in nervous transmission, since the other features of a sensation, such as sensation magnitude, quality, etc., take a longer time (about 500 msec.) to develop to their final strength. Inhibition seems to indicate further, that spatial patterns of neural activity are at least as important as the time patterns recorded by the oscilloscope in electrophysiology. Spatial patterns indicate selective action of the nervous system in many instances contrary to the indications of time patterns. To prove that selective activity may occur, single taste papillae were stimulated with chemicals and their taste observed. It was evident that there are papillae which react only to sugar and other only to quinine, acids or salt.

A65-82268
STIMULUS CODING IN THE COCHLEAR NUCLEUS.
Nelson Y. S. Kiang, Russell R. Pfeiffer, W. Bruce Warr, and Ann S. N. Backus (Mass. Eye and Ear Infirmary, Eaton-Peabody Lab. of Auditory Physiol., Boston; and Mass. Inst. of Technol., Res. Lab. of Electron., Cambridge).
Annals of Otology Rhinology and Laryngology, vol. 74, Jun. 1965, p. 463–485. 40 refs.
NASA Grant NsG-496; Contract DA-36-039-AMC-03200 (E); and Grants NSF GP-2495 and PHS MH-04737-05 and NB-01344.

The proposition that units in different subdivisions of the cochlear nucleus have characteristically varying discharge patterns is investigated. Adult cats were anesthetized and cochlear nuclei were exposed by either retracting or aspirating part of the cerebellum. Acoustic stimuli were delivered to the ear drum through a hollow bar. Spike discharges were recorded on magnetic tape and subsequently processed by means of digital computers to obtain histogram displays. Units in the anterodorsal portion of the anteroventral part of the cochlear nucleus (AVCN) have distinctive interspike-interval histograms for spontaneous and continuously stimulated activity. The interstitial (IN), posteroventral (PVCN), and possibly the anteroventral portions of the cochlear nucleus may contain units with similar discharge patterns to simple stimuli. "Primarylike" units have been found in the IN and PVCN. "Choppers" can be found in the dorsal portion of the cochlear nucleus, but are mainly in the IN and PVCN. "On" units are found almost exclusively in the IN and PVCN, but a few may be present in the posterior AVCN and a few may be present in the AVCN and the dorsal part of the cochlear nucleus (DCN). "Pausers" are found only in the DCN.

A65-82269
FLUID BALANCE IN THE INNER EAR.
Merle Lawrence (Mich. U. Med. School, Dept. of Otorhinolaryngol., Kresge Hearing Res. Inst., Ann Arbor).
Annals of Otology Rhinology and Laryngology, vol. 74, Jun. 1965, p. 486–499. 15 refs.
Grant Natl. Inst. of Neurol. Diseases NB-03410.

Consideration of the causes of pressure and metabolic imbalance in the ear lead to the conclusion that a metabolic imbalance must be responsible for any change in endolymphatic fluid volume as well as responsible for local disturbance to hair cell function. Experiments are reported in which a microelectrode is used to record the endolymphatic potential and cochlear microphonic of a localized region of the organ of Corti during conditions of general anoxia and of restricted injury to the stria vascularis in the region of the microelectrode. It is shown that injury to the blood supply in a very small region has the same effect upon hair cell function of that region as does generalized anoxia. It is concluded that localized vascular dysfunction plays an important part in the creation of some types of hair cell malfunction.

A65-82270
SOME ATTRIBUTES OF "LOUDNESS RECRUITMENT" AND "LOUDNESS DECRUITMENT".
Edmund Prince Fowler.
Annals of Otology Rhinology and Laryngology, vol. 74, Jun. 1965, p. 500–506.

Several aspects of loudness recruitment and decruitment are discussed. Loudness recruitment is defined as a change (an increase) in the increment of loudness related to stimulus, greatest just above threshold and diminishing with increasing stimulus. It occurs only in ears with a neural lowering of hearing, pathological or not. Loudness decruitment is defined as a change (a deceleration) in the increment of loudness related to stimulus, least just above threshold and increasing with increasing stimulus. It occurs only in ears with a pathological neural lowering of hearing, with or without recruitment. Recruitment and decruitment as related to tone and reaction time are useful in differentiating between peripheral and non-peripheral lesions and in better determining the level of auditory neural lesions and whether they are primarily tactile cell (cochlear) or neurolima, or wholly fiber lesions. They are easy to test for and should be routinely employed in studying how the ear functions in health and disease.

A65-82271
INFLUENCE OF HYPOXEMIA AND HYPERCAPNIA ON INTRAOCULAR TENSION AND TONE OF INTRAOCULAR VESSELS [VLIIANIE GIPOKSEMII I GIPERKAPNII NA VNUTRIGLAZNOE DAVLENIE I TONUS VNUTRIGLAZNYKH SOSUDOV].
S. IA Sazonov (I. P. Pavlov First Med. Inst., Dept. of Ophthalmol. and Dept. of Physiol., Leningrad, USSR).
Fiziologicheskii Zhurnal SSSR, vol. 51, Sep. 1965, p. 1057–1065. 25 refs.
In Russian.

In dogs and cats the blood vessels of the iris of the ciliary body, and of the choroid were found to be sensitive to changes in partial pressure of oxygen and carbon dioxide of the blood. They dilate during hypoxia and hypercapnia, and constrict when the partial pressure of carbon dioxide decreases and that of oxygen increases in the retinal tissues. The regulatory mechanism of supplying oxygen and removing carbon dioxide is located primarily in the choroid. The regulation of partial pressure of these gases results in regulation of blood flow in the eye vessels and of the tonus of the eye blood vessels, and affects the intraocular tension. The pressure within the eye, however, has no effect on vessel tonus and blood flow in the normal eye.

A65-82272
THE ULTRASTRUCTURAL EFFECTS OF CARBON MONOXIDE INHALATION OF THE RAT LUNG.
Albert H. Niden and Heribert Schulz (Med. Acad., Pathol. Inst., Dusseldorf, West Germany).
Virchows Archiv für pathologische Anatomie und Physiologie und für klinische Medizin, vol. 339, 1965, p. 283–292. 18 refs.
Grant Natl. Heart Inst. H-6918.

Rats were exposed to air mixture containing 0.5% to 1.0% carbon monoxide, for 13 to 137 minutes. The pulmonary changes consisted of: (1) swelling of alveolar epithelial cell mitochondria and nucleus, (2) capillary endothelial and alveolar epithelial swelling, and (3) capillary platelet thrombosis. Due to the swelling of the epithelium the alveolar lining was damaged and the basement membranes of the capillaries were no longer covered with epithelium. As a result of the marked swelling of endothelium and epithelium lumen the capillaries and alveolar spaces appeared to be narrow slits. The concentration of inhaled carbon monoxide was more important in producing these changes than the level of blood CO-Hb, or the duration of exposure to carbon monoxide. The results suggested that carbon monoxide has a direct effect on pulmonary tissue.

A65-82273
THE ABSORPTION INTENSITY OF THE $5\nu_3$ BAND OF CARBON DIOXIDE, AND THE MARTIAN CO_2 ABUNDANCE AND ATMOSPHERIC PRESSURE.
Philip L. Hanst and Paul R. Swan (AVCO Corp., Res. and Advan. Develop. Div., Wilmington, Mass.)
Icarus, vol. 4, Sep. 1965, p. 353–361. 9 refs.

The surface pressure of the Martian atmosphere strongly affects the design and payload capabilities of Mars entry vehicles. The current most widely accepted value of this surface pressure is 25 millibars. This value was determined by Kaplan, Münch, and Spinrad based on their observation of CO_2 absorption lines near 8700 Å and on Sinton's and Kuiper's CO_2 observations at 2.06 microns. It is noteworthy that their estimated value of 25 millibars is a factor of 3 or 4 below estimates determined both by photometric and by polarimetric techniques. A laboratory redetermination of the integrated absorption intensity of the $5\nu_3$ band of CO_2 near 8700 Å has been made with a long-path technique and photomultiplier detection. This has resulted in a revision of the calibration used by Kaplan, Münch, and Spinrad. In view of the importance of the surface pressure to current studies of Mars probes, a recalculation of the pressure utilizing the new laboratory measurements is carried out in this paper. The results of the present analysis give a revised value of (31±13) m-atm. for the Martian CO_2 abundance under the assumption of an effective temperature for the Martian atmosphere of 200° K. The surface pressure is now estimated, using this abundance value, to be (51±25) millibars.

A65-82274
THE ROLE OF THE ARTERIAL CHEMORECEPTORS AND BARORECEPTORS IN THE CIRCULATORY RESPONSE TO HYPOXIA OF THE RABBIT.
P. I. Korner (New South Wales U., School of Physiol., Sydney, Australia).
Journal of Physiology, vol. 180, Sep. 1965, p. 279–303. 63 refs.
Life Insurance Med. Res. Fund of Australia and New Zealand supported research.

The circulatory responses of the conscious rabbit were examined in normal animals and in animals with chronic section of carotid and aortic nerves, during inhalation of low O_2 mixtures of CO mixtures. The role of the arterial chemoreceptor and baroreceptor reflexes were assessed. In arterial hypoxia reduction in arterial P_{O_2} to 35–40 mm. Hg resulted in a transient increase in cardiac output, tachycardia and maintenance of the arterial pressure. Further reduction in arterial P_{O_2} to about 30 mm.Hg resulted in bradycardia, transient reduction in cardiac output and a rise in blood pressure. These effects are of chemoreceptor origin. They are accentuated by simultaneous elevation of P_{CO_2} in normal but not in de-afferented rabbits. There were no signs of chemoreceptor excitation in tissue hypoxia produced by inhaling CO in air. The circulatory response consisted of an increase in cardiac output, slight tachycardia and a fall in blood pressure. Baroreceptor reflexes limited the fall in arterial pressure and contributed to an increase in cardiac output in this type of hypoxia. The circulatory responses to low O_2 in the normal rabbit simulated the varying responses of other species. Each species response appears related to the degree of chemoreceptor stimulation, and not in intrinsic susceptibility to hypoxia because the responses to CO are similar.

A65-82275
EFFECT OF SENSORY STIMULI ON SINGLE UNIT ACTIVITY IN THE POSTERIOR HYPOTHALAMUS.
Nachum Dafny, Ephraim Bental, and Shaul Feldman (Hadassah U. Hosp., Dept. of Nervous Diseases; and Hebrew U.-Hadassah Med. School, Jerusalem, Israel).
Electroencephalography and Clinical Neurophysiology, vol. 19, Sep. 1965, p. 256–263. 18 refs.
Grant NIH RF 37.

The effects of sciatic, acoustic and photic stimuli on 147 units in the posterior hypothalamic nucleus of the anesthetized cat were statistically evaluated for their influences on the rate and pattern of firing. The mean spontaneous firing rate of these units is low, i.e., 0.54 spikes/sec., with 68%, 73.5% and 76.8% of the cells responding to photic, acoustic and sciatic stimuli, respectively, with various degrees of facilitation or inhabition. Histograms drawn for these units have shown both early and long latency responses with double or triple peaks. In 105 cells convergence was found, with more than half of the units responding to all three modalities. These results demonstrate, at the single cell level, the existence of somato-sensory, visual and acoustic projections to the posterior hypothalamus, which may modify its various autonomic functions.

A65-82276
EXCITABILITY CYCLE OF THE VISUAL CORTEX DURING SLEEP AND WAKEFULNESS.
Mario Palestini, Mario Pisano, Guido Rosadini, and Gian Franco Rossi (Genoa U., Clin. Neurochir., Italy).
Electroencephalography and Clinical Neurophysiology, vol. 19, Sep. 1965, p. 276–283. 30 refs.
Contract AF EOAR 64-11; and *Consiglio Nazl. delle Ric. supported research.*

The excitability cycle of the visual cortex of intact unanesthetized cats was studied during the states of wakefulness, sleep with EEG synchronization, and sleep with EEG desynchronization. The study was made by analysing the relative amplitudes of the two potentials evoked in the visual cortical area by two identical stimuli to the optic radiations, separated by a variable time interval. The excitability of the visual cortical neurons was higher during sleep than during wakefulness; no significant differences were found between the two phases of sleep. The phenomenon is tentatively interpreted by assuming that during sleep the cerebral cortex is released from an inhibitory influence exerted by the reticular activating system. The fluctuations of cortical excitability during synchronized sleep might be due to the varying activity of the synchronizing thalamo-cortical circuits; its relative stability during desynchronized sleep might be ascribed to an ascending hypnogenic brainstem influence. Different cortical areas might show different excitability changes during sleep and wakefulness; the excitability changes of the thalamus seem to be partially different from those of the cerebral cortex.

A65-82277
RELATIONSHIP OF EEG BACKGROUND RHYTHMS TO PHOTIC EVOKED RESPONSES.
E. A. Rodin, J. L. Grisell, R. D. Gudobba, and G. Zachary (Mich. Epilepsy Center, Lafayette Clin., Neurol. Res. Div., Detroit; and Wayne State U., Detroit).
Electroencephalography and Clinical Neurophysiology, vol. 19, Sep. 1965, p. 301–304. 11 refs.

Photic evoked responses were obtained in twenty normal male and twenty normal female subjects. It was demonstrated that females tend to have larger amplitude evoked responses than males. Intercorrelations of aspects of the evoked response curve with results of the frequency analysis of the EEG background showed highly significant correlations between amplitude of the photic response and energy amount of the EEG. Individuals with large amplitude evoked response curves showed a greater abundance of activity in all frequency bands than those who had small amplitude evoked response curves. The complexity of the evoked response curve—as reflected in the total number of positive peaks—was found to be significantly correlated with the amount of fast activity in the basic EEG.

A65-82278
RESOLUTION AND STABILITY IN THE AUTOSPECTRA OF EEG.
D. J. Hord, L. C. Johnson, A. Lubin, and M. T. Austin (U.S. Navy Med. Neuropsychiat. Res. Unit, San Diego, Calif.)
Electroencephalography and Clinical Neurophysiology, vol. 19, Sep. 1965, p. 305–308. 5 refs.
Grant NSF GB 922, and Navy Dept. supported research.

The limits to which power spectral analysis can be used in EEG research are described in terms of resolution and stability. Often the full potential of a computer is not realized because the mathematical filters of the program are adjusted so that their resolving ability is similar to that of visual analysis. This results in the production of broad uninformative frequency bands. Using a very fine resolution that is just within the limits of acceptable stability yields autospectrograms that distinguish stages of sleep.

A65-82279
ADAPTATION WITH CONSTANT AND VARIABLE DELAY IN AUDITORY FEEDBACK.
Samuel Fillenbaum (N. C. U., Chapel Hill).
Psychonomic Science, vol. 3, Jul. 15, 1965, p. 45–46.
Grant Natl. Inst. of Mental Health M-1849.

The effects of an irregularly varying delay in auditory feedback (VDAF) were compared with those of a constant delay in feedback (DAF) with regard to: (a) impairment in level of performance, (b) adaptation in performance, and (c) possible differences in rate of adaptation. Performance in a reading task was compared using a DAF interval of .20 sec. and a VDAF interval varying irregularly from .10 to .28 sec. No difference was found between conditions in amount of impairment in performance. There was a significant improvement upon continued reading in both conditions, and there was no difference between conditions in the rate of improvement.

A65-82280
ACOUSTIC FACTORS VERSUS LANGUAGE FACTORS IN SHORT-TERM MEMORY.
R. Conrad, P. R. Freeman, and A. J. Hull (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain).
Psychonomic Science, vol. 3, Jul. 15, 1965, p. 57–58. 10 refs.
Contract AF 49(638)-1235.

Forty-five subjects recalled 6-consonant sequences immediately after letter by letter visual presentation. The main factor contributing to ease of recall was within-sequence acoustic confusability. Language habits were relatively unimportant. Single-letter language frequency was unrelated to recall; second order effects made a small but significant contribution.

A65-82281
VISUAL NOISE CAUSES TUNNEL VISION.
Norman H. Mackworth (Harvard U., Cambridge, Mass.)
Psychonomic Science, vol. 3, Jul. 15, 1965, p. 67–68. 12 refs.
NASA Grant NsG-718 and Contract OE-4-10-136.

Subjects had to detect quickly similarities between two uppercase letters presented peripherally and one other central letter falling on the fovea. The legibility of the three characters made the task very easy when the three letters were flashed on by themselves. The addition of extra letters to this display seriously impaired performance. The periphery of the retina could no longer accurately detect at a glance whether items were similar. Foveal performance was also affected to some extent by extra items in the periphery of the retina.

A65-82282
SELECTIVE INTERMANUAL TRANSFER OF ADAPTIVE EFFECTS DURING ADAPTATION TO PRISM.
Samuel C. McLaughlin and John L. Bower (Tufts U., Medford, Mass.)
Psychonomic Science, vol. 3, Jul. 15, 1965, p. 69–70.
Contract MD-2714.

Complete adaptation to prism has the appearance of a unitary phenomenon but, at intermediate states of adaptation, the total adaptive effect can be analyzed into two components which combine additively. One of these two components transfers 100% from adapted hand to unadapted hand, whereas the other does not transfer at all. It is concluded that one is a change in the apparent position of the visual stimulus while the other is a change in the felt position of the adapted hand.

A65-82283
ADAPTATION OF HUMANS TO COLORED SPLIT-FIELD GLASSES.
Thomas L. Harrington (Ore. U., Eugene and Portland).
Psychonomic Science, vol. 3, Jul. 15, 1965, p. 71–72.
NIH supported research.

"Split-field" glasses, consisting of a red filter before the left half-field of each eye and a green filter before the right half-field, were worn by three observers. The colors in the glasses did not seem to diminish in saturation as Kohler (1951) has reported, even after as long as 146 days. A very small change in perceived color could be noticed as the gaze was moved back and forth from right to left without the glasses on, but this may have an explanation at the ocular level.

A65-82284
THE EFFECT OF NUMBER OF PULSES ON VIBROTACTILE THRESHOLDS.
Ronald T. Verrillo (Syracuse U., N. Y.)
Psychonomic Science, vol. 3, Jul. 15, 1965, p. 73–74. 5 refs.
ONR supported research.

Absolute thresholds for vibration were determined as a function of pulse number and contactor area on human glabrous skin. The results indicate that if a sufficiently large contactor is used, the skin summates the energy over pulse number and over the contactor area. The results also support the hypothesis that cutaneous tissue may contain more than one type of mechanoreceptor.

A65-82285
A COMPARISON OF FORWARD AND BACKWARD MASKING.
Peter H. Schiller and Marilyn C. Smith (Mass. Inst. of Technol., Cambridge).
Psychonomic Science, vol. 3, Jul. 15, 1965, p. 77-78. 13 refs.
Grant Natl. Inst. of Gen. Med. Sci. T1 GM-1064.

Differences between forward and backward masking were studied by employing a disk, a ring and a pattern as masking stimuli and letters as test stimuli. The results show that interference is greater in forward than in backward masking. Interference was found to decrease monotonically with increasing interstimulus intervals (IS1) in all cases. Of the three masking stimuli, the ring produced the least interference and the pattern the most.

A65-82286
A U-SHAPED BACKWARD MASKING FUNCTION IN VISION: A PARTIAL REPLICATION OF THE WEISSTEIN AND HABER STUDY WITH TWO RING SIZES.
M. S. Mayzner, M. H. Blatt, W. H. Buchsbaum, R. T. Friedel, P. E. Goodwin, D. Kanon, A. Keleman, and W. D. Nilsson (N. Y. U., New York).
Psychonomic Science, vol. 3, Jul. 15, 1965, p. 79-80. 5 refs.

A partial replication of the visual masking study by Weisstein and Haber (1965) was performed incorporating the additional variable of masking ring size in order to investigate the discrepancy between findings of that study and the study by Eriksen and Collins (1964). Errors in discriminating the capital letters O and D in a forced choice design were measured with 4 subjects when the exposure of either letter was accompanied or followed by either a masking ring of a stroke width equal to that of the letter or five times as large as the stroke width of the letter. The delays between the offset of the letter and the onset of the masking ring were concurrent, 0, 20, 40, 60, and 80 msec. Recognition was a u-shaped function of the delay for both ring sizes; however, the number of errors for the two ring sizes differed significantly, with the smaller ring having more overall errors. Therefore, the results approximated those of Weisstein and Haber, and indicated that masking ring size is an important variable in visual masking studies, although this variable alone did not produce the discrepancy that is found between Weisstein and Haber and Eriksen and Collins.

A65-82287
ESTHETIC PREFERENCE AS A FUNCTION OF PATTERN INFORMATION.
Donald D. Dorfman (San Diego State Coll., Calif.)
Psychonomic Science, vol. 3, Jul. 15, 1965, p. 85-86.

This study tested the hypothesis that pattern preference is a function of the informational value of a set of patterns where information is manipulated by varying matrix grain. The results showed an inverse-U related between information and preference. These results agreed with the findings of Munsinger and Kessen (1964) who varied the coordinality of the patterns rather than matrix grain.

A65-82288
ADAMS' BISENSORY DISCRETE TRACKING TASK AND THE PSYCHOLOGICAL REFRACTORY PERIOD: A COMMENT.
Raymond S. Nickerson (Decision Sci. Lab., L. G. Hanscom Field, Bedford, Mass.)
Psychonomic Science, vol. 3, Jul. 15, 1965, p. 87-88. 19 refs.
AF Systems Command supported research.

A discussion is presented on the bisensory discrete tracking experiment reported by Adams (1962) in which the results favored an "expectancy" interpretation of the "psychological refractory period" (PRP) over the "single channel" interpretation. The author challenges the validity of the experiment as a test of the single channel interpretation of the PRP. The results in his view are compatible with a "single channel" hypothesis.

A65-82289
STEREOSCOPIC ACUITY AND OBSERVATION DISTANCE.
James P. Brown, Kenneth N. Ogle, and Louise Reiher (Mayo Clin. and Mayo Found., Sect. of Biophys. and Mayo Graduate School of Med., Dept. of Ophthalmol., Rochester, Minn.)
Investigative Ophthalmology, vol. 4, Oct. 1965, p. 894-900. 10 refs.
Grant Inst. of Neurol. Diseases and Blindness B-1852.

Because of the contradictory evidence as to whether stereoscopic acuity varies with observation distance, this study was undertaken to investigate the problem, with the utmost care being taken to maintain constant experimental conditions and to eliminate empirical clues to depth perception. By means of a haploscopic apparatus, which allowed careful control of all parameters, the stereoscopic acuity of three subjects with full accommodation was determined in prolonged experiments for seven observation distances from 6 m. to 40 cm. Standard psychophysical methods were used. The results indicated that stereoscopic acuity remains essentially constant, at least for observation distances beyond 50 cm. For one subject there was no change in stereoscopic acuity in distances from 6 m. to 40 cm. Two subjects showed essentially no change from 6m. to 50 cm., but they did show a small decrease at the distance of 40 cm. It was found also that controlling pupil size was unnecessary with a constant level of adapting luminance of about 50 millilamberts.

A65-82290
VESTIBULAR CHANGES FOLLOWING ULTRASONIC IRRADIATION.
Hector Giancarlo, Young Bin Choo, Dorothy Wolff, Ricardo H. Bisi, and Ernest A. Weymuller (N. Y. Eye and Ear Infirmary, Res. Dept., New York).
Archives of Otolaryngology, vol. 82, Oct. 1965, p. 365-375. 15 refs.
NIH supported research.

An anatomical approach was developed and used for the purpose of exposing the vestibular labyrinth to ultrasonic radiation superficially and without penetrating the middle ear and bulla of the cat. Of the 40 ears examined, 20 of which were the ears directly exposed to the beam, only one ear exhibited hemorrhage. This occurred at the base of the horizontal crista, in the connective tissue of the exposed ear. It involved neither the sensory epithelium nor the nerve fibers nor the vestibular ganglion cells. The presence of virtually no hemorrhages in this experiment is important in view of the fact that it has been thought (without microscopic substantiation) that one of the pathological reasons for the functional results in brain tissue was hemorrhage. These observations suggest that many of these conditions may be reversible and that the subject of ultrasonic exposure merits further pursuit.

A65-82291
BRAIN REACTION TO EXPERIMENTAL INJURY AFTER HYPOTHERMIA.
Hubert L. Rosomoff (Pittsburgh U., School of Med., Div. of Neurol. Surg. and Veterans Admin. Hosp., Pittsburgh, Pa.), Raymond A. Clasen (Presbyterian-St. Luke's Hosp., Div. of Pathol., Chicago, Ill.), Robert Hartstock, and Jose Bebin (Henry Ford Hosp., Sect. of Neuropathol., Detroit, Mich.)
Archives of Neurology, vol. 13, Oct. 1965, p. 337-345. 19 refs.
Grants Natl. Inst. of Neurol. Diseases and Blindness NB-2469 and NB-3677.

The brains of paired dogs were injured by freezing and the course of the reaction to injury was analyzed. One animal of each pair was normothermic at the time of injury; the other was hypothermic at 25°C. and then rewarmed one hour after the lesion was made. Comparison, at intervals, of the normothermic and hypothermic groups disclosed reduced exudation and reaction at six hours, and increased inflammation at 24 hours in the hypothermic injury, and after two weeks demarcation and collagen formation were striking. At six weeks, the two lesions showed minor differences; at 12 weeks, both were replaced by well-formed mesenchymal scars. It was concluded that demonstrated reductions in mortality by hypothermia resulted from a more rapid transition from the exudative to the reparative stage of the reaction to injury.

A65-82292
EFFECTS OF INTERMITTENT ILLUMINATION ON PERCEPTUAL-MOTOR PERFORMANCE.
Stefan Slak and Josef Brožek (Lehigh U., Bethlehem, Pa.)
Journal of Applied Psychology, vol. 49, Oct. 1965, p. 345-347. 6 refs.
Grant NIH MH 07179.

The experiment was designed to determine whether under conditions of intermittent illumination there is a significant impairment in performance as measured by perceptual-motor tasks. Performance on five such tasks under five conditions of flickering light was compared with performance under steady light. Time and error scores were considered. No gross detrimental effects of intermittent illumination were detected.

A65-82293
VERBAL CODING AND DISPLAY CODING IN THE ACQUISITION AND RETENTION OF TRACKING SKILL.
Don Trumbo, Lynn Ulrich, and Merrill E. Noble (Kan. State U., Manhattan).
Journal of Applied Psychology, vol. 49, Oct. 1965, p. 368-375. 11 refs.
Grant AFOSR 526-64.

One hundred and twenty subjects were trained on a pursuit tracking task with an irregular step-function input. Cues for coding the task were introduced via pretraining and rehearsal of a numerical code and by display overlays in a 2x2x3 design. Three levels of specificity of cues were provided by the overlays with the most specific condition providing a numerical code like that of pretraining. The results showed that both pretraining and display coding facilitated early reduction of tracking error, but that neither these nor rehearsal of the numerical code affected retention performance after one week. Taken together, these findings suggested that the verbal and display cues were used in the early coding of the task but were less important later in practice and at retention.

A65-82294
DOGMATISM AND PREDECISIONAL INFORMATION SEARCH.
Barbara H. Long and Robert C. Ziller (Goucher Coll., Baltimore, Md.; and Del. U., Newark).
Journal of Applied Psychology, vol. 49, Oct. 1965, p. 376-378. 16 refs.
Grant AF-AFOSR-62-95.

Rokeach's Dogmatism Scale and four decision measures of tendencies to reserve judgment were administered to 72 freshmen women. A significant negative relationship was found between dogmatism and each of the four decision measures. The nondogmatic individual tended to delay decision and engage in predecisional search, to require more time for psychophysical judgments, and to respond "don't know" to statements of opinion under condi-

tions of inadequate information. Accordingly, dogmatism was interpreted as a defense mechanism which interferes with processing of predecisional information.

A65-82295
EFFECT OF PEAK LEVEL ON THE LOUDNESS OF TRIANGULAR TRANSIENTS.
N. L. Carter and R. P. Gallo (Commonwealth Acoust. Labs., Sydney, Australia).
Journal of Auditory Research, vol. 5, Apr. 1965, p. 119–131. 6 refs.

An experiment matching the loudness of triangular transients and continuous white noise, using a double staircase method with forced choice, is described. Transients at three pulse repetition rates and white noise at four levels were used. The rise time of the transients was 0.5 millisec. and the duration was 1.0 millisec. The results are in close agreement with those of a previous experiment using the method of adjustment with white noise as the standard stimulus. Equal-loudness levels of transients and white noise disagree with those found in a further experiment on the effect of repetition rate on the loudness of transients. Some possible causes of this difference are discussed.

A65-82296
RELIABILITY OF HIGH-FREQUENCY THRESHOLDS.
John L. Fletcher (U. S. Army Med. Res. Lab., Fort Knox, Ky.)
Journal of Auditory Research, vol. 5, Apr. 1965, p. 133–137.

Absolute thresholds in 2 kc. steps from 4 through 16 kc. were collected on 15 soldiers aged 18–25. Thresholds are not reported in sound pressure level. A provisional audiometric "zero" was established on high school students. Reliability coefficients for any frequency between any two of three separate threshold sessions were usually of the order of .80 or higher. Of 30 coefficients (3 for each of 10 frequencies) only two were insignificant. At 4, 6, and 8 kc. the thresholds were compared to thresholds on the same 15 subjects from a standard Rudmose ARJ-5 audiometer. Validity coefficients were .71, .24, and .82 respectively. These are about as good as reliability coefficients on the ARJ-5 audiometer alone (.92, .42, and .54). It is concluded that an apparatus and technique exist to collect high-frequency absolute thresholds with some confidence.

A65-82297
PROTECTION FROM HIGH INTENSITIES OF IMPULSE NOISE BY WAY OF PRECEDING NOISE AND CLICK STIMULI.
John L. Fletcher (U. S. Army Med. Res. Lab., Fort Knox, Ky.)
Journal of Auditory Research, vol. 5, Apr. 1965, p. 145–150. 6 refs.

Fifteen young men and women were exposed once a day to impulses of 160 and 170 db. SPL. Pre- and post-exposure Békésy audiograms were collected at 3, 4, 5, 6, and 8 kc. In some cases the loud impulses were preceded either by a train of clicks or by white noise, at either 105 db. or 120 db. sensation level, designed to arouse the acoustic protective reflex. A significant effect of arousal stimuli did indeed appear on analysis of variance, but all four arousal stimuli reduced temporary threshold shift about equally (10 db. down from an average of 13.5 db. with no reflex-arousal stimulus).

A65-82298
SPEAKING AND LISTENING THROUGH THE HEAD: I. THE INTELLIGIBILITY OF SPEECH RECORDED IN QUIET AT DIFFERENT POSITIONS ON THE HEAD AND THROAT.
Keith K. Neely and S. E. Forshaw (Defence Res. Med. Labs., Toronto, Canada).
Journal of Auditory Research, vol. 5, Apr. 1965, p. 151–157. 12 refs.

The relative intelligibility of bone-conducted speech uttered in a quiet environment and picked up by each of four different transducers at six positions on the head and throat was investigated with four trained male speakers. The taped speech lists were heard by 16 normal-hearing listeners. Speech intelligibility scores and articulation index calculations gave similar relative estimates of intelligibility. Speech signals were most intelligible from on the forehead, next from the back of the head. The effects of position of the transducer upon the intelligibility of speech was independent of the type of transducer used but tended to vary between speakers. The results of this investigation formed the basis for the development of a two-way bone-conduction communication system for divers. Work has been initiated to determine the effectiveness of the system in various noise environments.

A65-82299
HEPATOTOXICITY OF INHALED TRICHLOROETHYLENE AND TETRACHLOROETHYLENE: LONG-TERM EXPOSURE.
Bengt Kylin, Istvan Sumegi, and Sven Yllner (Natl. Inst. of Public Health, Dept. of Occupational Hyg.; and Karolinska Inst., Dept. of Pathol., Stockholm, Sweden).
Acta Pharmacologica et Toxicologica, vol. 22, 1965, p. 379–385. 10 refs.

The hepatotoxicity of trichloroethylene and tetrachloroethylene, was studied in mice submitted to long-term exposure by inhalation. Duration of exposure was four hours daily for six days a week over periods of one, two, four and eight weeks. Effects on the liver were evaluated by histological examination and determination of extractable liver fat. The most conspicuous histological change consisted of fatty degeneration. With trichloroethylene this lesion was slight even at a concentration of 1,600 p.p.m., but with tetrachloroethylene it was massive at as little as 200 p.p.m. Neither liver cell necrosis nor cirrhosis was discernible. One the basis of these findings the hygienic threshold for tetrachloroethylene is discussed.

A65-82300
EFFECT OF DRUGS ON SPONTANEOUS SLOW POTENTIAL OSCILLATIONS OF THE CEREBRAL CORTEX.
Stata Norton and Robert E. Jewett. (Kan. U. Med. Center, Dept. of Pharmacol., Kansas City).
Journal of Pharmacology and Experimental Therapeutics, vol. 149, Sep. 1965, p. 301–310. 24 refs.
Grant Natl. Inst. of Mental Health MH 07278.

Using nonpolarizable electrodes and d.c. amplifiers, rhythmic oscillations of the steady potentials can be recorded from the cortex of conscious, unrestrained cats. These waves represent a continuous spectrum wth the electroencephalogram. Three main frequency groups are distinguishable: 8–12 c.p.m., 3–5 c.p.m., and 0.5–1.5 c.p.m. Voltages of these waves range from 100 to 600 μ V. During activated sleep (low voltage, desynchronized electroencephalogram (EEG) there is a negative shift of 400–1000 μ V. Except for the 8–12 c.p.m. waves, which were not quantified, all slow waves, inducing periodic shifts with activated sleep, were blocked by amphetamine and chlorpromazine but not by sedative doses of BW 58-271 (2-methyl 2-benzylamino pyrrolo-(2-3-d) pyrimidine) or thiopental. Motor behavior in response to an environmental stimulus (handling the cats) was not depressed by amphetamine but was markedly reduced by chlorpromazine, BW 58-271 or thiopental. After amphetamine the EEG showed a continuous desynchronized low voltage pattern when the cats were undisturbed, while following chlorpromazine the EEG stayed in a synchronized light sleep pattern. Evidence that the origin of the cortical slow waves and shifts during sleep patterns may be either limbic or reticular is discussed.

A65-82301
EFFECT OF BLOOD GASES AND ACID-BASE DISTURBANCES ON THE PULMONARY CIRCULATION.
Daniel H. Simmons, Leonard M. Linde, and Bertrand J. Shapiro (Cedars-Sinai Med. Center, Mount Sinai Div., Div. of Med.; and Calif. U. Med. Center, Depts. of Med., Physiol., and Pediat., Los Angeles).
(Am. Coll. of Chest Physicians, 30th Ann. Meeting, San Francisco, Jun. 18–22, 1964).
Diseases of the Chest, vol. 48, Oct. 1965, p. 347–350.
Grant PHS HE 08075.

Factors affecting pulmonary hemodynamics (cardiac output and pulmonary vascular resistance) are outlined. Among these are changes in blood gases (pO_2, pCO_2 and pH). Major effects on both flow and resistance are due to decreased pO_2, increased pCO_2 and decreased pH in contrast to changes in opposite directions. These blood gas changes, which are those usually observed in pulmonary disease all lead to increased pulmonary vascular resistance, direct myocardium depression, and myocardium stimulation via increased sympatho-adrenal discharge. These blood gas changes in normal individuals lead to increased cardiac output in spite of direct myocardial depression and increased pulmonary resistance. In pulmonary disease with cor pulmonale, inappropriately low cardiac output is usually observed because of increased work of the heart and myocardial depression.

A65-82302
TRAINABILITY OF OLD MEN.
Arne M. Benestad (Inst. of Work Physiol; and Inst. of Occupational Health, Oslo, Norway).
Acta Medica Scandinavica, vol. 178, Sep. 1965, p. 321–327. 11 refs.

Thirteen old men, aged 70–81 years, volunteered in a training program involving treadmill exercise for 5 to 6 weeks. The training resulted in a decrease of the heart rate, oxygen uptake relationship. This indicates an improved work efficiency. There was also noted a significant rise in blood volume and total amount of hemoglobin, and a tendency to enlargement of cardiac volume. These findings are assumed to be beneficial reactions. They are, together with the reduced heart rate, interpreted as the cause of a greater oxygen pulse and a possible greater stroke volume. Thus the final result is an improved pumping capacity of the heart. The training did not affect the aerobic work capacity. The influence on the mental well-being, however, was a marked response to the training.

A65-82303
ACUTE RENAL FAILURE DUE TO CARBON TETRACHLORIDE POISONING
Viggo Kamp Nielsen and Jens Larsen (Rigshosp., Med. Dept. P, Div. of Nephrol., Copenhagen, Denmark).
Acta Medica Scandinavica, vol. 178, Sep. 1965, p. 363–374. 36 refs.

Five subjects with acute renal failure following acute intoxication with CCl_4 have been treated since 1958. Detailed case reports are given. Four patients developed protracted oliguria, necessitating treatment with the artificial kidney. Renal function was restored to normal in all patients. Because of diagnostic difficulties a careful inquiry into the possible exposure to CCl_4 is advised in every case presenting concomitant gastrointestinal, hepatic, and renal symptoms of uncertain origin. The value of active treatment, including dialysis, in cases of CCl_4 poisoning with renal failure is illustrated by author's results as well as by a review of the literature. Among 128 cases, collected from the literature of the last decade, 120 presented renal failure, 44 were dialysed, and the overall mortality was 17 per cent. Among 77 cases, published between 1939 and 1953 (i.e. from a period during which hemodialytic treatment of uremia had not yet gained widespread usage), 74 presented renal failure, and the overall mortality was 36 per cent. Despite the improved prognosis following the introduction of hemodialytic management of renal failure due to CCl_4 poisoning, this intoxication is, however, still an important public health hazard. For most purpose CCl_4 could readily be replaced by other, less toxic, chemicals.

A65-82304
THEORETICAL ASPECTS OF THE ROLE OF ANGULAR ACCELERATION IN VESTIBULAR STIMULATION.
R. S. Weaver (Defence Res. Med. Labs., Toronto, Canada).
Acta Oto-Laryngologica, Supplementum 205, 1965, 37 p.

Equations of motion are applied to the human vestibular apparatus when undergoing movement. Typical turntable experiments are considered, and the physical effects of the associated motions are analyzed, with special emphasis on the forces experienced by the semicircular canals. In appendices, vector algebra is developed, and equations of motion are derived in vector form. Graphs and a nomograph for evaluation of the results of centrifugal acceleration are presented in another appendix. Vestibular physiology is a field of vital importance in modern scientific endeavor if man is expected to operate high speed aircraft and space vehicles efficiently. The description and analysis of the forces and motions encountered is the task of the physicist, but the experimental work on the human subject in the laboratory and the reactions observed in the field must be evaluated by the physiologist. The most rapid and fruitful advances in this area will undoubtedly result from the collaborative efforts of physicists and physiologists.

A65-82305
EFFECTS OF BILATERAL CALORIC HABITUATION ON VESTIBULAR NYSTAGMUS IN THE CAT.
Mary Jayne Capps and William E. Collins (FAA, Civil Aeromed. Res. Inst., Oklahoma City, Okla.).
Acta Oto-Laryngologica, vol. 59, Jun. 1965, p. 511-530. 20 refs.

Transfer of bilateral caloric nystagmus habituation to unilateral caloriztion was investigated in a group of 60 cats. Habituation to bilateral caloric irrigations markedly reduced responses to both less intense and more intense unilateral stimulation. Subsequent testing provided information concerning the effects of caloric habituation on: (1) directional specificity of response, (2) retention of the response decline, and (3) optokinetic nystagmus. Statistical analyses also indicate a sex difference in response magnitude.

A65-82306
ON THE BEHAVIOUR OF THE MICROPHONIC EFFECT OF THE COCHLEA DURING HYPOTHERMIA: AN EXPERIMENTAL STUDY.
P. Menzio, G. Voena, and A. Sartoris (Turin U., Ear, Nose and Throat Clin., Italy).
Acta Oto-Laryngologica, vol. 59, Jun. 1965, p. 531-540. 12 refs.

The behavior of the cochlear microphonic effect in animals subjected to gradual body cooling without previous barbiturate narcosis was studied. The hypothermia, in some cases, has even reached a level of 13.5°C. It was shown that close connections exist between the degree of temperature, and therefore between body metabolism, and the amplitude of the cochlear microphonic effect caused by sound stimulations of constant intensity. In experimental animals it was possible, with subsequent body warming, to obtain the return of the microphonic potentials to the pre-experimental level. The auricular apparatus in mammals is therefore capable of tolerating a very high degree of hypothermia without functional damage.

A65-82307
ACETYLCHOLINESTERASE ACTIVITY IN THE EFFERENT FIBERS OF THE STATO-ACOUSTIC NERVE.
Richard R. Gacek, Yasuya Nomura, and Károly Balogh (Mass. Eye and Ear Infirmary and Mass. Gen. Hosp., Boston).
Acta Oto-Laryngologica, vol. 59, Jun. 1965, p. 541-553. 16 refs.
Grant Natl. Inst. of Neural. Diseases and Blindness NB 04155-03.

Acetylcholinesterase activity was demonstrated histochemically in the efferent system of the VIIIth nerve. The distribution of the olivocochlear bundle was studied in decalcified temporal bones of cats. In addition to confirming the known course of the bundle, efferent fibers going to the apical and middle turn were seen in the cochlear nerve trunk. Similarly, the pathway of the vestibular efferent system was verified, but more fibers were localized than by previous investigations using other techniques. Selective transection of the efferent system to both divisions of the inner ear resulted in the loss of demonstrable enzyme activity.

A65-82308
INFLUENCE OF INTENSE ACOUSTIC STIMULATION ON THE COCHLEAR RESPONSE [INFLUENCE D'UNE STIMULATION ACOUSTIQUE INTENSE SUR LA REPONSE DE LA COCHLEE].
M. Aubry, P. Pialoux, and M. Burgeat (Lab. d'Oto-Neurol. Exptl., Paris, France).
Acta Oto-Laryngologica, vol. 60, Sep. 1965, p. 191-196. 10 refs. In French.

Cochlear microphonic potential recordings in guinea pigs, after loud sound stimulation, have shown a cochlear fatigue phenomenon. The influence of the general physiological conditions on that phenomenon have been studied. Under certain conditions it is possible to record a paradoxical augmentation of that potential during recovery.

A65-82309
EXPERIMENTAL STUDIES ON SOUND TRANSMISSION IN THE HUMAN EAR. VI. CLINICAL AND EXPERIMENTAL OBSERVATIONS ON NON-OTOSCLEROTIC OSSICLE FIXATION.
B. S. Elpern, O. Greisen, and H. C. Andersen (Aarhus U., Dept. of Otolaryngol., Denmark).
Acta Oto-Laryngologica, vol. 60, Sep. 1965, p. 223-230. 14 refs.
Danish State Res. Found. and F. L. Smidth and Co. A/S's Jubilaeumsfond supported research.
Grants Natl. Inst. of Neurol. Diseases and Blindness NB 02806-04 and NB 1430-01.

The functional influence of non-otosclerotic fixating lesions of the middle ear is investigated by reviewing two unusual cases and, experimentally, by creating such lesions in human temporal bones and observing the subsequent alteration in sound transmission. The effect of experimental fixation at each of five specific sites on the ossicular chain is discussed with respect to clinical observations.

A65-82310
DICHOTIC LISTENING AND CEREBRAL DOMINANCE.
James Inglis (Queen's U., Dept. of Psychiat., Kingston, Ontario, Canada).
Acta Oto-Laryngologica, vol. 60, Sep. 1965, p. 231-238. 30 refs.
Grant Ontario Mental Health Found. 25.

It has recently been suggested that errors of report in the sequential recall of simultaneously presented auditory stimuli may be due to the inferior perception of those stimuli, under conditions of auditory competition, which are delivered to the ear ipsilateral to the cerebral hemisphere dominant for speech. It can, however, be argued that this is not necessarily the most adequate hypothesis to account for these and analogous data. Evidence may be adduced which suggests that the order of recall may be of more importance than laterality of recall. The errors of reproduction observed may therefore be due to a decay of input in a short-term store rather than due to the failure of part of the input to enter the system. Since such short-term storage may be a crucial and vulnerable link in the whole chain of learning it might be anticipated that defects in this process would be found in cases of learning disorder. Studies are cited which show that this appears, in fact, to be the case.

A65-82311
A STUDY OF THE ACOUSTIC REFLEX IN INFANTRYMEN.
Michael H. L. Hecker and Karl D. Kryter (Bolt Beranek and Newman Inc., Cambridge, Mass.).
Acta Oto-Laryngologica, Supplementum 207, 1965, 16 p. 18 refs.
U. S. Army Med. Res. and Develop. Command supported research.

The degree of reflex response to monaurally presented white noise (100 db. SPL) was measured and graphically recorded at the contralateral ear for 40 career infantrymen with an acoustic bridge. These soldiers have been exposed to controlled amounts of weapon noise, and pre- and post-exposure audiograms were obtained. The results show that subjects with a high pre-exposure hearing level are less susceptible to TTS than subjects with normal hearing. The results further indicate that a strong acoustic reflex is associated with high rather than low pre-exposure hearing level for subjects having no appreciable conductive hearing impairment. Subjects with suspected middle-ear disorders exhibited no reflex response to the same stimulus.

A65-82312
THE BREATHING FUNCTION IN VARIOUS POSITION [SIC] OF THE BODY.
M. Laban, M. Budimir, B. Mijuskovic, and P. Spasic (People's Rep. of Serbia, Inst. for Tuberc., Belgrade, Yugoslavia).
Medicine and Surgery, vol. 5, Jum. 1965, p. 30-31.

Various aspects of breathing mechanics were studied in 28 subjects, 21 of whom were patients confined to a bed rest situation. A change in body position from the sitting posture to the horizontal diminished the vital

capacity about 5%, and decreased the expiratory reserve volume on the average of 54%. The inspiratory reserve volume increased in the horizontal position about 25%, while the residual air volume did not change significantly. The functional residual capacity in the sitting position was significantly greater. With these results it appears that breathing in the horizontal position allows for better gas exchange efficiency. Blood circulation as measured in 15 of the subjects showed more acceleration in the sitting position. The horizontal position was judged to have distinct advantages for respiration during therapeutic regimens.

A65-82313
PERCEPTURAL-MOTOR SPEED RATIO AND ACCIDENT PRONENESS.
S. N. Ghosh (Indian Inst. of Technol., Kharagpur, India) and R. C. Tripathi (Allahabad U., India).
Indian Journal of Applied Psychology, vol. 11, Jan. 1965, p. 10–16. 6 refs.

Eighty-five skilled workers were given two tests measuring motor speed and two tests measuring perceptual speed to confirm the hypothesis that in accident-prone individuals the level of muscular reaction if above their level of perception. The subjects were rated according to an accident index, and a group more accident prone than the control group was selected. The results proved negative to Drake's hypothesis, in that the control group tended to manifest higher motor speed. Previously Drake had shown that the highest accident groups had the highest motor speed. It is thought that if accidents are a result of poor motor-perceptual skills then any individual would be more liable to accidents the farther he deviated from a hypothetical standard of motor-perceptual coordination.

A65-82314
PROBLEMS POSED IN MEASURING OXYGEN CONSUMPTION DURING LOCAL MUSCULAR WORK [PROBLEMES POSES PAR LA MESURE DE LA CONSOMMATION D'OXYGENE AU COURS DU TRAVAIL MUSCULAIRE LOCAL].
H. Monod and A. Laville (Centre Natl. de la Rech. Sci., Lab. de Physiol. Travail., Paris, France).
Travail Humain, vol. 28, Jul.–Dec. 1965, p. 293–309. 35 refs. In French.

The oxygen consumption has been measured in human subjects during static and dynamic work of low intensity (local muscular work) by means of an open circuit method. The energy cost of intermittent static work increases linearly with the force which is applied; the cost of dynamic work of low intensity is a linear function of the power output. The authors use their results as the basis for a discussion on methodology, the interpretation of measurements of oxygen consumption, and the applications of their procedure to the study of local muscular work in the field of ergonomics. They point out some of the difficulties in the way of estimating the energy cost of local muscular work of low intensity from measurements of the pulmonary ventilation and the heart rate.

A65-82315
STUDIES ON THE ALTERATIONS OF THE AUDITORY APPARATUS CAUSED BY INDUSTRIAL WORK IN NOISY ENVIRONMENT [RECHERCHE SUR LES ALTERATIONS DE L'APPAREIL AUDITIF PROVOQUEES PAR LE TRAVAIL INDUSTRIEL EN MILIEU BRUYANT].
J. Morin (Ecole Prat. des Haute Etudes, Lab. de Psychol. Appl., Paris, France). (XV Congr. Internatl. de Psychol. Appl., Ljubljana, Aug. 1964).
Travail Humain, vol. 28, Jul.–Dec. 1965, p. 317–330. 10 refs. In French.

The auditory capacities of 149 workers in a French automobile construction company were examined. They constitute the whole group of blacksmiths in the enterprise, exposed for a variable number of years to noises whose general level usually exceeds 105 db. The examination, given after several hours of auditory rest, included tonal audiometry (air and bone), vocal audiometry, an otoscopic examination and a directive interview. The principal results were as follows: (1) An important bilateral deficiency for most workers, mainly in the high part of the spectrum was found. (2) A cochlear type of deafness, with strong correlations between air and bone channels was shown. (3) A strong relationship existed between deficiency and number of years spent in a noisy work, while the maximum deficiency seems proportional to the logarithm of time speed. (4) Some workers seemed much less sensitive than others to the same auditory trauma. (5) An excellent agreement existed between measurements of tonal and vocal deficiency. And (6) a good agreement was found between the different measurements and subjective nuisance experienced by blacksmiths in every day life (talking, telephone, radio, television, etc.).

A65-82316
ALTERED CARDIAC RETENTION OF EXOGENOUS NORADRENALINE PRODUCED BY STRESS IN YOUNG RABBITS.
C. N. Gillis (Yale U. School of Med., Dept. of Pharmacol., New Haven, Conn.).
Nature, vol. 27, Sep. 18, 1965, p. 1302–1304. 5 refs.
Grant Natl. Heart Inst. H-7249.

In young rabbits, intraperitoneal injections of hydrocortisone sodium succinate significantly decreased both the supernatant and the particulate tritiated dl-noradrenaline-7 (injected 15 min. after the last injection of the corticoid) in heart tissue homogenate. The fact that this reaction was not greater than that observed after injection of saline indicated involvement of the pituitary-suprarenal axis or activation of the sympatho-suprarenal system. In such a case, anesthesia would reduce or abolish this effect. In anesthetized young animals, hydrocortisone injections appeared to reduce the particulate-bound tritiated noradrenaline as compared to that in saline-treated rabbits, but did not affect the supernatant fraction. Because mock injections produced the same effect as the saline, it is assumed that the mechanism responsible for the corticoid effect is due to stress induced by handling the young animals during the experiment. Adrenocorticopituitary-tropic hormone injections produced the same effect as saline. This indicates mediation of the pituitary-suprarenal-cortical system in depressing tritiated norepinephrine or involvement of stress-induced sympatho-suprarenal activation.

A65-82317
MITOSIS INDUCING EFFECT OF LIGHT IN MIXOTROPHIC SYNCHRONOUS CULTURES OF CHLORELLA [DIE TEILUNGSINDUZIERENDE WIRKUNG DES LICHTES IN MIXOTROPHEN SYNCHRONKULTUREN VON CHLORELLA].
Horst Senger (Tübingen U., Inst. für Chem. Pflanzenphysiol., West Germany).
Archiv für Mikrobiologie, vol. 51, 1965, p. 307–322. 19 refs. In German.

The influence of light on cell division was studied in synchronous cultures of Chlorella pyrenoidosa (Pringsheim strain 211-8b). Sufficient production of organic substance also resulted in the dark by adding 5% glucose to sterile cultures. The effects of different times of illumination, various light intensities and different times of preculturing in the dark were followed by determining the percent of divided cells, total cell number, cell size, dry weight, content of carbohydrate, total nucleic acid and RNA content. Under the described conditions, light was not required to substance production but only for inducing cell division. In those cultures initial cell divisions were induced after 4 hrs. of illumination. Preculturing in the dark and higher light intensities shortened the time of irradiation required to obtain the same rate of cell division. A relation between percentage of divided cells and the amount of nucleic acids could not be confirmed. These and other results are compared with those of authors working with autotrophic cultures. Possible ways of how light is influencing cell division are discussed.

A65-82318
HUMAN ADAPTABILITY TO MILITARY SPACE SYSTEMS.
Gerald W. Parker, John W. Ord, and Bryce O. Hartman (Aerospace Med. Div., Wright-Patterson AFB, Ohio).
Air University Review, vol. 16, Sep.–Oct. 1965, p. 29–40.

Problems of human adaptability to extraterrestrial conditions encountered during military use of manned orbital spacecraft are discussed. Prolonged stay in a closed system, such as a space cabin, presents physiological and psychological problems. Physiological adaptability is necessary under impact of stresses caused by changing status of weightlessness and acceleration. It requires adjustments of various physiological factors, such as blood and body-fluid volumes, blood flow, motor activity, mineral composition of body tissues, and integrated nervous and respiratory functions. Although a considerable loss of weight was noted in astronauts during prolonged orbital missions, apparently due to loss of water, the general physiological functions and mental and motor performance indicated that man can survive in space. Psychological problems, such as emotional reactions to an unusual environment and sensory and social deprivation seemed to be met satisfactorily by the astronauts. Many questions still remain unanswered before it can be determined whether or not man is indispensable in space flight to justify manned space craft rather than having automated systems supplant man, which would make military space systems more economical.

A65-82319
"MAN–MACHINE" SYSTEMS AS RELATED TO NEW PROFESSIONAL ACTIVITIES AND TO PREVENTIVE MEDICINE, WITH SPECIAL REGARD TO AVIATION [I "SISTEMI UOMO–MACCHINA" NEL QUADRO DELLE NUOVE ATTIVITA PROFESSIONALI E DELLA MEDICINA PREVENTIVA CON PARTICOLARE RIGUARDO ALL'AERONAUTICA].
Mario Strollo.
Rivista Aeronautica, vol. 41, Aug.–Sep. 1965, p. 1221–1238. In Italian.

Following a discussion of the concept of the man–machine system, the characteristics of the system in civilian and military environments are presented. Described are various human factors (ability to select and calculate accurately, perception, knowledge of the system and its function, flexibility, intelligence, decision making power, etc.), and machine properties (proper display of information, accessibility, legibility, etc.). Special consideration is given to man–machine systems in aviation and preventive medicine.

A65-82320
GENETIC VARIATION AND ITS INFLUENCE ON PROTECTION BY L-CYSTEINE AGAINST GAMMA RADIATION.
Noorul Hasan Mahmood, S. M. Ifzal, and Fakhrul Islam (Atomic Energy Centre, Radiobiol. Div., Lahore, India).
Pakistan Journal of Scientific and Industrial Research, vol. 8, Jul. 1965, p. 112–117. 23 refs.

Four closely related strains of Escherichia coli have been used in studies of genetic variation and its influence on protection by L-cysteine against gamma radiation. The effect on the survival of bacteria after treatment with different bacteriostatic and bactericidal agents (radiation, H_2O_2, penicillin and heat) was studied. An attempt has been made to correlate genetic constitution of the cells to H_2O_2 senstivity, radiation response variability and protection by the -SH containing amino acid. It has been shown that the surviving fraction of these strains if previously treated with the protective agents shows a range in protection ratio depending upon the strain chosen, under similar experimental conditions.

A65-82321
CONTRIBUTION TO THE STUDY OF VESTIBULAR FUNCTION OR "SENSE OF SPATIAL ORIENTATION" [CONTRIBUTION A L'ETUDE DE LA FONCTION VESTIBULAIRE OU "SENS DE L'ORIENTATION SPATIALE"].
André Montandon (Geneva U., Clin. et Policlin. d'oto-rhino-laryngol., Switzerland).
Archives des Sciences, vol. 18, May-Aug. 1965, p. 453-462. 40 refs.
In French.

A description is presented of electronystagmography (ENG) in terms of the automatic registration of ocular nystagmus, the rotatory stimulation of the semicircular canals, and the statistical analysis of results. ENG may be applied to the clinical diagnosis of pathological vertigo, cranial injuries, cerebral circulatory disorders, and neuro-otological disorders. Animal experiments with ENG are discussed which permit, by means of the stereotaxic method of stimulation of nervous centers, study of functional correlations between diencephalic or bulbar centers responsible for vestibular nystagmus. Statistical analysis of results confirms the value of vestibulometric frequency parameters and of the duration of nystagmic threshold used during rotatory tests. During supersonic and space flight, man is exposed to various violent mechanical stresses and accelerations which produce vertigo and neurovegetative disorders. Vertigo results from spatial disorientation accompanying an illusion of displacement. Vegetative disorders accompany any vestibular excitation stronger than vertical, horizontal, or rotatory movement. The value of ENG in studying the degree of sensitivity of aviators and astronauts to vestibular displacement in space is discussed.

A65-82322
THE FUNCTIONS OF DREAM CYCLES.
Louis H. Nahum.
Connecticut Medicine, vol. 29, Oct. 1965, p. 701-702, 705. 6 refs.

It has been well established that dream cycles of comparatively long duration occurring several times during sleep are normal in man and in some animals and that eye movements indicate such dream cycles. The fact that dream deprivation leads to physiological and psychic disturbances of the organism is indicative of the necessity of dreaming for normal body function. Experiments indicate that some drugs, such as tranquilizers decrease dream time; others such as gamma-butyrolactone, induce sound sleep with normal dream-periods. Yet, a third type of compound-- sodium butyrate--is known to induce dream periods in cats. The author suggests that more stress should be put on the neurochemistry of dream functions. Like any other basic, normal, biological state, dreaming must have certain connections with the chemical changes causing and regulating such state. The author suggests that acetylcholine discharges may be of importance in that they direct the events in the nervous system, which has a leading role in dreaming.

A65-82323
PULMONARY GAS EXCHANGE AFTER HEMORRHAGE DURING INTERMITTENT POSITIVE PRESSURE BREATHING.
Kai Rehder, Peter Teichert, Otto Hessler, and Stephen W. Carveth (Chir. Universitätsklin, Anesthesia Dept., Würzburg, West Germany).
Anesthesia and Analgesia, vol. 44, Sep.-Oct. 1965, p. 618-622. 15 refs.

Pulmonary performance was studied in 7 dogs before and after hemorrhage and after retransfusion of the lost amount of blood. After hemorrhage the ratio of physiologic dead space to tidal volume and the arterial carbon dioxide pressure (PCO_2) rose. The carbon dioxide elimination, the oxygen uptake and the arterial oxygen saturation and oxygen pressure (PO_2) were reduced. The increased physiologic dead space was due to increased anatomic and alveolar dead space. After retransfusion, the ratio of physiologic dead space to tidal volume and the arterial oxygen saturation returned to the prehemorrhage value. The arterial PCO_2 decreased toward the control value.

A65-82324
THE BEHAVIOR OF THE STROKE VOLUME DURING REST AND PHYSICAL WORK IN MAN [DAS VERHALTEN DES HERZSCHLAGVOLUMENS IN RUHE UND WAHREND KORPERLICHER ARBEIT BEIM MENSCHEN].
G. Gattiker (Zürich, Med. Universitätsklin., Switzerland).
Cardiologia, vol. 46, 1965, p. 348-369. 33 refs. In German.

Important discrepancies exist in the literature between earlier and more recent reports about the behavior of the stroke volume during physical exercise. They are mainly due to differences in the methods used for cardiac output determination and to differences in the body position of the subjects. In this study cardiac output is determined according to the direct Fick method using cardiac catheterization on subjects at rest or performing short-term muscular exercise in the supine position. In a preliminary investigation the influence of the body position on the stroke volume at rest was examined in 17 patients with heart disease. Changing from the supine to the sitting position decreased the stroke volume by one third. In 22 healthy subjects O_2-consumption, A-V O_2-difference, cardiac output, pulse rate, and stroke volume were determined at rest in the supine position, and the mean stroke volume increased 6% as compared to the stroke volume at rest. When the stroke volume determined at a lower exercise level, and not with the stroke volume at rest, a 2.5% decrease was found. The significance of these stroke volume changes was calculated and discussed.

A65-82325
THE EFFECT OF HYPEROXYGENATION ON THE ACTIVITY OF SUCCINATE DEHYDROGENASE, ADENOSINE TRIPHOSPHATASE, THE SH GROUPS, AND DEOXYRIBONUCLEIC ACID IN EXPERIMENTAL TUMOURS.
E. C. Crăciun, Florica Motoc, Smaranda Constantinesco, and L. Georgescu (Inst. of Morbid Anat. "Victor Babes", Bucharest; and Inst. of Med. and Pharm., Dept. of Morbid Anat., Timişoara, Rumania).
(First Intern. Symp. of Histochem., Warsaw, May 13-16, 1963).
Folia Histochemica et Cytochemica, vol. 3, 1965, p. 115-118. 6 refs.
Polish Acad. of Sci. supported research.

The effect of hyperoxygenation on the activity of succinate dehydrogenase, ATPase, DNA, and SH groups was determined in experimental cancer. Thirty albino rats who received transplants of Goérin tumor were kept for four days in jars containing 30% oxygen. The results showed: (1) In hyperoxygenated animals the liver dehydrogenase was less active in spite of the fact that tumor tissue did not show marked changes. It would, therefore, seem that the respiratory potential of liver tissue is less active in certain points of the oxidative chain of the Krebs cycle. (2) The ATP-ase activity in the tumor, as well as in the liver, of hyperoxygenated animals decreased as compared with the control animals. The reaction produced by the SH groups shows a higher intensity in the liver of control animals than in the hyperoxygenated ones. At the same time the tumors present an inverse picture which would demonstrate that atmosphere rich in oxygen partially replaces the role of ATP-ase and of the oxidation-reduction system. Histophotometric readings showed an increased transmission of light for DNA both in the tumor and the liver under hyperoxygenation. This condition therefore interferes with synthesis of DNA, which was less abundant than in normally oxygenated animals.

A65-82326
EFFECT OF SUPINE EXERCISE ON LEFT VENTRICULAR VOLUME AND OXYGEN CONSUMPTION IN MAN.
Richard Gorlin, Lawrence S. Cohen, William C. Elliott, Michael D. Klein, and Francis J. Lane (Peter Bent Brigham Hosp., Med. Clin. and Harvard Med. School, Boston, Mass.)
Circulation, vol. 32, Sep. 1965, p. 361-371. 20 refs.
Grants NIH H 2637; Harvard Med. School 2248-2 and 2007-2; and Peter Bent Brigham Hosp. GRS 9725-8.

Subjects with nearly normal left ventricles have been studied during rest and supine leg exercise, by left heart catheterization and use of aortic thermodilution technics. It was demonstrated that the average end-diastolic volume for the group did not change during exercise, but that the ventricle enptied more completely to a smaller end-systolic volume and accomplished this in less time per beat than at rest. Stroke volume was increased most frequently in the group with increased end-diastolic volume. It is suggested that the response to supine exercise involves primarily increase in rate coupled with an inotropic stimulation of the heart, but that in some instances the Starling mechanism plays a distinct and important part by augmenting ventricular filling and emptying. Energy consumption of the exercising heart could be correlated with those indexes reflecting an increase in kinetics of fiber shortening rather than force or tension development, which changed little in these experiments. The increase in external mechanical efficiency during exercise would seem to be due to reduction in mean systolic heart size (with increase in ratio of external to total work of fiber), and to the fact that the heart has a basal oxygen cost (which becomes a progressively smaller fraction of the total).

A65-82327
NEW TECHNIQUE FOR RECORDING SKIN RESISTANCE.
Stephen Kaplan (Spectra-Phys., Inc., Mountain View, Calif.) and James L. Hobart (Mich. U., Dept. of Psychol., Ann Arbor).
American Journal of Medical Electronics, vol. 4, Jul.-Sep. 1965, p. 117-120. 13 refs.

Since there is growing evidence that galvanic skin response (GSR) and basal resistance level (BRL) are indices of a central state of arousal or nonspecific neural activity, a simple reliable inexpensive recording technique is of some interest. A recording system is described with utilizes any 10-millivolt, high-impedance servo recorder and a control unit designed for the purpose. A particularly important feature of this system is the wideband rectilinear writeout of the servo recorder. This results in a record from which both BRL

and GSR can be scored, and eliminates the need for an operator and/or automatic scale-shifting necessary for certain widely used skin-resistance recording systems. A number of technical advantages of the system are also discussed. The use of the system is described not only for human and rat experiments in which skin resistance is a central variable, but also for many other experiments where arousal variations may be produced unintentionally. It is concluded that such auxiliary recording could lead to new insights and discoveries.

A65-82328
RESPONSE TIME TO THE SECOND OF TWO SUCCESSIVE SIGNALS AS A FUNCTION OF ABSOLUTE AND RELATIVE DURATION OF INTERSIGNAL INTERVAL.
Raymond S. Nickerson (Decision Sci. Lab., Electron. Systems Div., Bedford, Mass.).
Perceptual and Motor Skills, vol. 21, Aug. 1965, p. 3–10. 14 refs.
AF Systems Command supported research.

An experiment was conducted to determine whether both the absolute and the relative duration of the S_1-S_2 interval would affect the response time to the second of two successive signals (RT_2) separated by an interval of brief but variable duration. Four different experimental conditions sampled different but overlapping ranges of intervals, thus allowing comparisons between RTs obtained with intervals of the same absolute but different relative durations, and conversely, with the same relative but different absolute durations. Under these conditions, RT_2 varied inversely with both the absolute and the relative duration of interval over the range of intervals generally associated with psychological refractory period.

A65-82329
TRANSFER OF TRAINING BETWEEN QUICKENED AND UNQUICKENED DISPLAYS.
Roger P. Dooley and John M. Newton (Omaha U., Neb.)
Perceptual and Motor Skills, vol. 21, Aug. 1965, p. 11–15. 6 refs.

Transfer effects between quickened and unquickened displays were assessed in terms of system error rather than the displayed error used in a previous study (Holland and Henson, 1965). Twelve subjects were divided into two groups of 6; each group received 100 1-min. learning trials on one display and then was switched to the other display for 5 trials. In both cases, transfer was positive but incomplete, a confirmation of Holland and Henson's findings. However, initial practice with the unquickened display was characterized by high performance variability, and this was not significantly reduced by previous practice with the quickened display.

A65-82330
COMPLEXITY JUDGMENTS OF PHOTOGRAPHS AND LOOKING TIME.
Bruce T. Leckart and Paul Bakan (Mich. State U., East Lansing).
Perceptual and Motor Skills, vol. 21, Aug. 1965, p. 16–18. 9 refs.
PHS supported research.

Thirty normal adult subjects viewed each of 30 color slides of real objects and places for as long as they wished. The stimuli had previously been rated on a 7-point scale of complexity and divided into three groups of 10 each representing three levels of complexity: high, low, and middle. The positive relationship between complexity and looking time previously found for other stimuli holds for realistic photographs as well.

A65-82331
INDIVIDUAL DIFFERENCES IN MAXIMAL SPEED OF MUSCULAR CONTRACTION AND REACTION TIME.
Leon E. Smith (Iowa U., Iowa City).
Perceptual and Motor Skills, vol. 21, Aug. 1965, p. 19–22. 11 refs.

Fifty college men participated in an investigation of the relationship between standing reaction time and the maximal vertical velocity, which the body can generate while in contact with the ground. The results support recent studies which reflect the high degree of specificity of individual differences in motor abilities. The nonsignificant correlation of –0.31 indicates that vertical bodyspeed cannot be predicted from a knowledge of standing reaction time.

A65-82332
CONTRIBUTION OF PERCEPTUAL SEGREGATION TO THE RELATIONSHIP BETWEEN STIMULUS SIMILARITY AND BACKWARD MASKING.
Elizabeth Fehrer (New York City U., Brooklyn Coll., N. Y.)
Perceptual and Motor Skills, vol. 21, Aug. 1965, p. 27–33. 6 refs.
Grant NSF G-19199.

This experiment confirms an earlier finding that similarity in size between test and masking stimuli is directly related to the extent of backward masking. In addition, it is shown that this relation is in part due to the greater difficulty in perceptually segregating test from mask when these are similar in size. The remainder of the effect, however, seems attributable to a retroactive masking effect that varies directly with stimulus similarity.

A65-82333
FOVEAL FLICKER FUSION USING A MOVING STIMULUS.
Grant D. Müller, Duane A. Anderson, and Ernest Simonson (Minn. U., Minneapolis).
Perceptual and Motor Skills, vol. 21, Aug. 1965, p. 43–51. 17 refs.
Grant NIH NB-01404-08 si.

The relationship between stimulus velocity and the critical-flicker-fusion frequency (CFF) of an intermittent visual stimulus was investigated by modulating the sweep-speed and intensity of an oscilloscope beam. When subjects fixated upon a stationary point, CFF showed an approximately linear increase as a function of velocity. Velocity did not, however, influence CFF when subjects fixated on the moving stimulus. The multiple correlation (.68) between CFF determinations obtained with a stationary stimulus versus those obtained with several different velocities implied that the same mechanisms which determined CFF under the former condition were also operative in the latter. The trend of the bivariate correlations between the average CFF values for isolated pairs of experimental conditions suggests that an additional factor, possibly spatial acuity, may have become progressively dominant as velocities exceeded 1.08°/sec.

A65-82334
PERFORMANCE OF NORMAL MALES ON THE HALSTEAD TACTUAL PERFORMANCE TEST UNDER SEVERE ENVIRONMENTAL STRESS.
James K. Arima (Combat Develop. Command Exptn. Center, Ft. Ord, Calif.)
Perceptual and Motor Skills, vol. 21, Aug. 1965, p. 83–90. 7 refs.

Normal soldiers undergoing demanding field maneuvers of varying severity were administered the Halstead Tactual Performance Test (TPT) under rigidly controlled conditions to determine the learning function underlying three administrations of test, as is customary in diagnostic testing, and to evaluate the effects of environmental stresses on performance. A control group was not subjected to the stressful conditions. Differing levels of environmental stress did not affect performance. A strong linear trend described the learning function. Of 75 subjects, 7 failed to complete the test in 10 min. on the first testing, 4 on the second testing, and none failed on the third testing. A dramatic reduction of variability among subjects on the first and second testings suggests that initially poor performance on the TPT may be related to factors other than impairment of the tactual sense modality, but inability to complete the test in 10 min. on the third trial would be distinctly abnormal.

A65-82335
A DEVICE FOR MEASURING SIMULTANEOUS FLEXION STRENGTH OF BOTH WRISTS.
T. L. Doolittle (Calif. State Coll., Los Angeles) and Gene A. Logan (Southwest Mo. State Coll., Springfield).
Perceptual and Motor Skills, vol. 21, Aug. 1965, p. 121–122.

A description of a device for measuring the simultaneous flexion strength of both wrists is presented, with the necessary information for its construction. A study establishing the reliability of the device is reported.

A65-82336
CONTINGENT DISCRIMINATION IN HUMANS.
Mymon Goldstein (Princeton U., N. J.) and Robert J. Weber (Kenyon Coll., Gambier, Ohio).
Perceptual and Motor Skills, vol. 21, Aug. 1965, p. 171–176. 7 refs.
Contract AF-AFOSR-62-197.

Six groups of 10 human subjects 14 to 18 years old, performed 4-display contingent discrimination tasks in which reinforcement was governed by 1 of 2 possible extra stimuli added to otherwise conventional discrimination displays. Each extra stimulus was related either to the identity or the position of the correct choice. Few errors occurred when identity of correct choice was relevant, but many more errors and some failures to reach criterion occurred when position of correct choice was relevant for some or all of the displays.

A65-82337
DISTRIBUTION OF HUMAN REACTION TIME.
John H. Borghi (Ariz. U., Tucson).
Perceptual and Motor Skills, vol. 21, Aug. 1965, p. 212–214.
Grant NSF 8270, GS 2488.

Over 4,000 reaction times to a visual stimulus were collected for one subject in a 5 month period. A normal distribution was approximated for the particular sensory-motor link studied.

A65-82338
RELATIVE HEIGHT ON THE PICTURE-PLANE AND DEPTH PERCEPTION.
Bruce E. Dunn (Minn. U., Minneapolis), Gary C. Gray, and Douglas Thompson.
Perceptual and Motor Skills, vol. 21, Aug. 1965, p. 227–236. 10 refs.
Grant NSF G24229; and Marshall U. Student Govt. supported research.

Geometric considerations of the two-dimensional projection of the three-dimensional visual field led to hypotheses about the possible effect on depth perception of: relative height in the picture plane, the type of supplied reference plane, and angle of regard. In three experiments subjects viewed pairs

of equidistant, horizontal rods in front of one of four backgrounds, with either an upward or downward angle of regard. The results confirm the hypothesis that relative height can operate to influence depth perception, that the type of background influences depth perception in the predicted direction, and that a response set resulting in a tendency for subjects to see higher objects as farther irrespective of the reference plane also occurs. The effects of angle of regard and of degree of vertical separation were not completely elucidated.

A65-82339
SCANNING FOR MULTIPLE TARGETS.
Ira T. Kaplan and Thomas Carvellas (N. Y. U. Med. Center, New York City).
Perceptual and Motor Skills, vol. 21, Aug. 1965, p. 239–243.
Grant Natl. Inst. of Mental Health MH08164.

Subject scanned a list of random letters looking for 1 to 5 target letters, which were read to him just before the list was presented. His scanning rate was estimated from a graph of the time required to find a target at different positions in the list. The more targets the subject was seeking, the more slowly he scanned. The time spent processing each non-target letter in the list increased in direct proportion to the number of targets for which the subject was searching.

A65-82340
INFORMATION TRANSMISSION WITH UNEQUALLY LIKELY ALTERNATIVES.
Jerry Lamb and Herbert Kaufman (Conn. U., Storrs).
Perceptual and Motor Skills, vol. 21, Aug. 1965, p. 255–259. 5 refs.
Contract Nonr 2512(00); and Grant Conn. U. 400-5-3R.

Previous investigations have concluded that the linear relation between reaction time (RT) and transmitted information found for equally likely stimuli (ELA) does not hold for unequally likely stimuli (ULA). However, the possibility still exists that a correspondence can be found by the use of a subjective probability measure. Accordingly, nine subjects were run on a choice-RT task under conditions of both ELA and ULA stimuli. The results for the ELA data confirm previous findings. The results for the ULA data not only do not support the experimental hypothesis but are completely at variance with previous results.

A65-82341
STORAGE OF INFORMATION ABOUT TIME.
Stuart J. Dimond (Trinity Coll., Dublin, Ireland).
Perceptual and Motor Skills, vol. 21, Aug. 1965, p. 261–262.

An experiment is described in which the detrimental effects of an auxiliary task on reaction time (RT) to periodically presented light stimuli were studied. RT stimuli were presented periodically to one group of subjects throughout the experiment and aperiodically to another. During the first half of the experiment both groups performed the RT task while simultaneously performing a key-pressing task, then both groups performed the RT task only. When performing the RT task only, the RTs of the 'periodic' group initially were of the same magnitude as those of the 'aperiodic' group but on subsequent period trials the RTs became significantly shorter. The results support the hypothesis that ability to gauge the time separating periodically occurring RT stimuli is impaired when subject is required simultaneously to perform an auxiliary task.

A65-82342
PERCEPTION BIBLIOGRAPHY: XX. PSYCHOLOGICAL INDEX, NO. 16, 1909.
R. B. Ammons and C. H. Ammons (Mont. U., Missoula).
Perceptual and Motor Skills, vol. 21, Aug. 1965, p. 287–290. 116 refs.

This is a listing of 116 items dealing with various aspects of perception, selected from the Psychological Index, no. 16, 1909.

A65-82343
AN INSTRUMENT FOR ONE- OR TWO-DIMENSIONAL TRACKING.
William C. Roehrig (N. Y. State Dept. of Mental Hyg., Biometrics Res.; and Columbia U., Dept. of Psychiat., New York City).
Perceptual and Motor Skills, vol. 21, Aug. 1965, p. 307–312.
Grant NIH NB-03852.

A rugged electro-mechanical tracking apparatus of simple, low-cost construction is described. The apparatus can be used for one-dimensional tracking by connecting only the longitudinal motor, thus forcing the target to move back and forth in either simple sinusoidal motion or according to the sum of two or three sinusoids. The relative phases of the three sinusoids can be rapidly altered, as can the amplitudes (within limits) of each of the sinusoids. The frequency of the sinusoids can be changed either independently or conjointly. By also connecting the cross-feed motor, an essentially unpredictable target path in two dimensions is obtained, and this path can be rapidly altered by changing cams, and/or frequency, amplitude, and phase of the sinusoids. Movement of the cursor is by low, constant torque lathe-type controls. The distance the cursor moves per each rotation of the controls, can be altered for either or both of the controls. A continuous error signal is generated which is directly proportional to the distance the cursor is off target in any direction.

A65-82344
MOTOR SKILLS BIBLIOGRAPHY: XLIV. PSYCHOLOGICAL ABSTRACTS, 1964, VOLUME 38, FIRST HALF.
R. B. Ammons and C. H. Ammons (Mont. U., Missoula).
Perceptual and Motor Skills, vol. 21, Aug. 1965, p. 315–318. 99 refs.

This is an alphabetical listing of 99 articles on motor skills selected from Psychological Abstracts, 1964, vol. 38, First Half.

A65-82345
TIME ESTIMATION AS AN INDICATOR OF ATTENTION-AROUSAL WHEN PERCEIVING COMPLEX AND MEANINGFUL STIMULUS MATERIAL.
Ingvar Bokander (Lund U., Sweden).
Perceptual and Motor Skills, vol. 21, Aug. 1965, p. 323–328. 6 refs.

The covariation between time estimation and simultaneous perception of visual stimuli chosen to evoke different amounts of attention arousal was studied. Pictures with high attention value or arousal potential slowed the conscious internal clock as compared with more neutral pictures. The loss of attention value in the loaded pictures after prolonged confrontation could be observed in subjects' time estimations. At the end of the experimental session the difference between pictures with initially different attention values disappeared in the time estimations.

A65-82346
STEROLS OF CHLORELLA. I. THE NATURALLY OCCURRING STEROLS OF CHLORELLA VULGARIS, C. ELLIPSOIDEA, AND C. SACCHAROPHILA.
Glenn W. Patterson and Robert W. Krauss (Md. U., Dept. of Botany, College Park).
Plant and Cell Physiology, vol. 6, Jun. 1965, p. 211–220. 14 refs.
NASA supported research.

The characteristics of the sterols naturally occurring in three species of Chlorella were examined. The algae were grown heterotrophically on glucose. Sterols were extracted and isolated from the lipid fraction and were characterized by means of chemical and physical tests. Chlorella vulgaris contained three sterols. Only the principal one, chondrillasterol, was identified. Chondrillasterol has been isolated previously from the genus Scenedesmus. Chlorella ellipsoidea and Chlorella saccharophila were found to contain sterols with oriented alkyl groups at C-24 in contrast to the oriented groups commonly found in higher plants. Poriferasterol was identified as the principal sterol of both algae. Clionasterol and 22-dihydrobrassicasterol were identified as the two secondary sterols present. None of these sterols has previously been reported to occur in plants. The isolation of 22-dihydrobrassicasterol has not been previously reported from any natural source.

A65-82347
DEGRADATION AND FORMATION OF SULFOLIPID OCCURRING CONCURRENTLY WITH DE- AND RE-GENERATION OF CHLOROPLASTS IN THE CELLS OF CHLORELLA PROTOTHECOIDES.
Isao Shibuya and Eiji Hase (Tokyo U., Inst. of Appl. Microbiol.; and Tokugawa Inst. for Biol. Res., Tokyo, Japan).
(Symp. on Biochem of Lipids, Sapporo, Jul. 1964).
Plant and Cell Physiology, vol. 6, Jun. 1965, p. 267–283. 21 refs.
Min. of Educ. and Charles F. Kettering Found. supported research.

By determining the radioactivities of chromatographically separated sulfur-containing compounds of the uniformly ^{35}S-labeled green and "glucose-bleached" cells, it was found that the concentration of a species of sulfolipid, as well as those of glutathione, sulfotrioses and most of the other sulfur-containing compounds, were at least 5 times higher in the green cells than in the bleached cells, while sulfoquinovosyl glycerol was present in approximately equal amounts in the two types of cells. Phospholipid contents and compositions in the two types of algal cells were found to be practically identical. The sulfolipid content of algal cells increased and decreased almost in parallel with the processes of greening and bleaching, respectively. Studying the mode of incorporation of radiosulfate into various sulfur compounds of algal cells during the processes of "light- and dark-greening" and "bleaching", it was found that active ^{35}S-incorporation into sulfolipid occurred throughout the process of "light-greening", while in the "dark-greening" and "bleaching" the active incorporation abruptly ceased after the initial 24 hour period of experiments. It was suggested that the biosynthesis of the sulfolipid is closely related to the formation of the photosynthetic apparatus in the chloroplast. When the ^{35}S-labeled green cells were bleached in a medium containing no radiosulfate, the ^{35}S-sulfolipid and most of other ^{35}S-sulfur compounds decreased markedly but the ^{35}S-sulfoquinovosyl glycerol increased considerably. It was inferred that the deacylation of the sulfolipid, a surfactant lipid, with formation of water soluble sulfoquinovosyl glycerol may be a cardinal event of the bleaching process, causing a disintegration of the intact architecture of the photosynthetic apparatus. Based on these observations it was concluded that the sulfolipid is an integral component of the photosynthetic structure.

A65-82348
DE- AND RE-GENERATION OF CHLOROPLASTS IN THE CELLS OF CHLORELLA PROTOTHECOIDES. III. EFFECTS OF MITOMYCIN C ON THE PROCESSES OF GREENING AND DIVISION OF "GLUCOSE-BLEACHED" ALGAL CELLS.
Shigeji Aoki and Eiki Hase (Tokyo U., Inst. of Appl. Microbiol.; and Tokugawa Inst. for Biol. Res., Tokyo, Japan).
Plant and Cell Physiology, vol. 6, Jun. 1965, p. 347-354. 29 refs.
Min. of Educ. supported research.

The "glucose-bleached" cells of Chlorella prototheooides, whose plastids were profoundly degenerated containing no trace of chlorophyll, were obtained by a method previously reported. Transferring the cells to the condition of re-generation of chloroplasts (greening)-incubation in the light in a glucose-less and nitrogen-rich medium-the effect of mitomycin C on the recovery process was investigated. It was found that the antibiotic suppressed completely the cell division without affecting the re-generation of chloroplasts. De novo formation of RNA and protein which has been observed to occur during the recovery process was not affected by the antibiotic to any significant extent. It thus became clear that the re-generation of chloroplasts, accompanied by the formation of chlorophyll, RNA and protein, occurring under the said condition, is not a phenomenon caused by the formation of new "normal" cells from previously degenerated cells. As was expected, the antibiotic suppressed strongly the DNA synthesis indicating that the new formation of DNA is not a necessary condition for the re-generation of chloroplasts in "glucose-bleached" algal cells.

A65-82349
STIMULUS PRESENTATION AND METHODS OF SCORING IN SHORT-TERM MEMORY EXPERIMENTS.
Neville Moray and Terence Barnett (Sheffield U., Dept. of Psychol., Great Britain).
Acta Psychologica, vol. 24, Jul. 1965, p. 253-263. 6 refs.
Contract Min. of Aviation PD/31/020/RI.

The transmission through channels distinguished by the physical characteristics of a voice has limitations similar to those due to spatial separation. By examining different kinds of error score, omissions, order errors, commissions, etc. mechanisms can be studied more clearly. By altering presentation rate, transmission strategy and the size of stimulus ensemble, these different mechanisms can be manipulated to some degree independently one of another. An important example of this last factor is the one of stimuli where the whole ensemble is present on each trial, so that there is in a very straightforward sense no ambiguity about content but only about order.

A65-82350
SUPERFICIAL RESPIRATION AND RESPIRATORY EDEMA PROVOKED IN THE RABBIT BY OZONE INHALATION [RESPIRATION SUPERFICIELLE ET OEDEME PULMONAIRE PROVOQUES, CHEZ LE LAPIN, PAR L'INHALATION D'OZONE].
J. Troquet and D. Colinet-Lagneaux (Liége U., Inst. Leon Fredericq, Belgium).
(Soc. Belge de Physiol. et de Pharmacol., Bruxelles, May 8, 1965).
Archives Internationales de Pharmacodynamie et de Therapie, vol. 157, Sep. 1965, p. 228-230. In French.

Ten pairs of rabbits (one vagotomized, the other with isolated pneumogastric trunks) were subjected to the inhalation of 180 p.p.m. of ozone. After several minutes of coughing, ozone induced a stable superficial respiration in animals with isolated pneumogastric trunks. Vagotomized rabbits reacted with moderate progressive polypnea. Ozone-induced pulmonary edema was significantly ($0.05 > p > 0.02$) more severe in vagotomized animals. In five pairs of rabbits similarly treated but without exposure to ozone, vagotomy produced neither edema nor appreciable pulmonary congestion.

A65-82351
THE ELECTROCARDIOGRAM AND ISCHEMIC HEART DISEASE IN AIRCRAFT PILOTS.
G. W. Manning (Victoria Hosp., Cardiovascular Unit, R.C.A.F. Central Med. Estab. ECG Lab., London, Ontario, Canada).
(Am. Coll. of Cardiol., New Orleans, La., Feb. 13, 1964).
Canadian Medical Association Journal, vol. 93, Jul. 24, 1965, p. 158-160. 11 refs.
R.C.A.F. and Ontario Heart Found. supported research.

A review of the Royal Canadian Air Force electrocardiographic (ECG) program for selection of aircrew and detection of coronary disease in trained aircrew is presented. Twenty reported cases of death due to coronary disease in pilots while at the controls of an aircraft are reviewed. The use of routine electrocardiography in the selection of aircrew has proved to be of considerable value, particularly in view of the high cost of training. The ECG continues to be our most sensitive means of detecting asymptomatic coronary disease in aircrew personnel. It is apparent that from both the military and commercial standpoint the aircraft accidents due to coronary disease is extremely small. This is due in large part to the careful medical supervision of flying personnel including the routine use of electrocardiography in the assessment of flying fitness of aircrew.

A65-82352
AN ANALYSIS OF THE SUPRASPINAL INFLUENCES ACTING ON MOTONEURONS DURING SLEEP IN THE UNRESTRAINED CAT: MODIFICATION OF THE RECURRENT DISCHARGE OF THE ALPHA MOTONEURONS DURING SLEEP.
M. M. Gassel, P. L. Marchiafava, and O. Pompeiano (C. N. R., Centro di Neurofisiol. e Gruppo d'Elettrofisiol., Pisa; and Pisa U., Ist. di Fisiol., Italy).
Archives Italiennes de Biologie, vol. 103, Feb. 1965, p. 25-44. 49 refs.
Grant PHS NB 02990-03.

In unrestrained, unanesthetized cats the recurrent discharge (RD) of motoneurons was recorded electromyographically from distal muscles of the hindlimb on antidromic stimulation of mixed nerves following chronic deafferentation of the animal. This has been used as a method of sampling the state of excitability of the motoneurons during physiological sleep and wakefulness. No significant change of the RD as recorded in a pair of antagonistic muscles occurred during transition from quiet wakefulness to synchronized sleep. A considerable, tonic depression of the RD, attributed to hyperpolarization of the motoneurons, occurred throughout desynchronized sleep. These changes in motoneuronal excitability paralleled the tonic depression of the monosynaptic reflexes, recorded during desynchronized sleep in the same muscles, before deafferentation of the animal. No additional change in the RD occurred during the periodic bursts of rapid eye movements (REM), in contrast with the phasic depression which affected the homonymous monosynaptic reflexes when the same population of motoneurons was tested orthodromically. The tonic depression of the RD occurring during desynchronized sleep was similar to the depression of the RD induced in the same animal by stimulating the inhibitory region of the medullary reticular formation following precollicular decerebration. On the other hand no change in the RD occurred after complete section of the spinal cord above the level of the antidromically stimulated motoneurons. These facts indicate that the steady change in membrane potential responsible for the depression of the RD during deep sleep is not due to functional spinal shock, such as might result from sudden withdrawal of a tonic descending facilitatory barrage, but that it must be attributed to an increase of descending inhibitory influences exerted by supraspinal structures. The absence of a further phasic depression of the RD during the periodic bursts of REM of desynchronized sleep, at a time when the monosynaptic reflexes show a striking phasic depression, has been advanced as indirect evidence supporting the thesis that the phasic depression of spinal reflexes during the REM period of desynchronized sleep is the result of presynaptic inhibition.

A65-82353
ON THE ORIGIN OF THE DARK DISCHARGE OF RETINAL GANGLION CELLS.
G. W. Hughes and L. Maffei (C. N. R., Centro Di Neurofisiol. e Gruppo di Elletrofisiol., Pisa; and Pisa U., Ist. di Fisiol., Italy).
Archives Italiennes de Biologie, vol. 103, Feb. 1965, p. 45-59. 31 refs.
Rockefeller Found. supported research.
Grant USAF 63-9.

In pretrigeminal or decerebratae cats microelectrode spike recording from the retina is performed. The pulses are counted in one second every two seconds after having exposed the eye from 2 to 5 minutes to a very strong light (4000 Lux). The firing rate of the ganglion cells becomes stationary in two to three minutes after the light cutoff, while the threshold goes on decreasing for a long time (up to 1 hour). The shape of the transients of the ganglion cells firing rate as a function of time for "on" and "off" cells are presented. Because no relationship is observed during dark adaptation between the threshold changes and the ganglion cell firing rate, the conclusion is drawn that the dark discharge is not due to the activity of the autochthonous activity of the deafferented neural part of the retina. Other considerations lead to the hypothesis that the bipolar cells do not contribute to the activity of the ganglion cells in darkness.

A65-82354
RELATIONSHIPS BETWEEN CEREBRAL AND MESODIENCEPHALIC NYSTAGMOGENIC CENTERS IN THE RABBIT.
E. Manni, G.B. Azzena, and M.L. Atzori (Sassari U., Ist. di Fisiol. umana, Italy).
(Italian Physiol. Soc., Meeting, Catania, Sep. 1963).
Archives Italiennes de Biologie, vol. 103, Feb. 1965, p. 136-145. 10 refs.

The physiological and anatomical relationships of the cerebral nystagmogenic area with the mesodiencephalic nystagmogenic center were investigated in rabbits. Unilateral acute and chronic lesions of the mesodiencephalic center abolished in a group of 14 rabbits the motor response of the ipsilateral cortical nystagmogenic area, while leaving intact the response of the opposite cortical areas. Only an ipsilateral increase of the cortical threshold was observed in other cases, possibly because the lesion was incomplete. Eye nystagmus could still be produced by electrical stimulation of the mesodiencephalic center after chronic destruction of the ipsilateral cerebral nystagmogenic cortex, thus proving that the effect is not due to stimulation of corticofugal fibers. Following unilateral chronic destruction of the cortical nystagmogenic area the pathways of degenerating fibers within the brain stem were investigated employing Marchi's method. Degenerated fibers were visible in the ipsilateral posterior limb of the internal capsule and in the lateralmost part

of the cerebral peduncle. Degenerated fibers passed into the ipsilateral medial and lateral geniculate bodies and superior colliculus, that is into structures which surround the mesodiencephalic nystagmogenic center. It is thus to be concluded that the mesodiencephalic nystagmogenic center is represented by a group of relay neurons intercalated in the neural paths connecting the cortical nystagmogenic area with the oculomotor nuclei.

A65-82355
INTERVAL ANALYSIS OF CELL DISCHARGE IN SPONTANEOUS AND OPTICALLY MODULATED ACTIVITY IN THE VISUAL SYSTEM.
J. M. Fuster, A. Herz, and O. D. Creutzfeldt (Max-Planck-Inst., Deut. Forschungsanstalt für Psychiat., Dept. of Exptl. Neurophysiol., Munich, West Germany).
Archives Italiennes de Biologie, vol. 103, Feb. 1965, p. 159–177. 38 refs.

Records of maintained discharge were taken from units in the optic tract, lateral geniculate body, and striate cortex of cats. Intervals between spikes were electronically measured and non-sequential histograms were obtained of spontaneous as well as of light-modified activity. Optic tract fibers show spontaneous discharge with mainly random properties. Geniculate and cortical cells tend to maintain grouped spike activity, a pattern of discharge yielding histograms with more or less manifest bimodality. Continuous illumination of the retina induces predominant changes in the incidence of modal intervals, which are those occurring most frequently in the record from a given unit. Intermittent light usually calls forth intervals which are shorter than the modal value in darkness. Thus, two forms of unit response can be identified in interval distributions depending on whether the stimulus is temporally continuous or discontinuous. We suggest, that one is expression of transmission of information on transient, the other one on steady stimulus conditions. Both are especially evident in optic tract fibers but are also found, though at a lesser degree, in geniculate and cortical cells.

A65-82356
STUDY OF A SIMPLE TEST FOR DISPOSITION FOR WORK: THE CT170 [ETUDE D'UN TEST SIMPLE D'APTITUDE A L'EFFORT: LA CT170].
R. Messin, H. Denolin, and S. Degré (Hôp. Universitaire Saint-Pierre, Brussels, Belgium).
Archives des Maladies du Coeur et des Vaisseaux, vol. 58, Mar. 1965, p. 305–316. 25 refs. In French.

During efforts of progressive intensity performed on the cycloergometer, the cardiac rate was measured during the last 30 seconds of each step. The test was interrupted in cases of subjective disorders, electrocardiographic changes, or when the heart rate finally reached 150. By extrapolation, it was possible in this latter case, to determine the load corresponding to a theoretical rate of 170 beats per minute (CT 170). This load corresponds to the maximum work a subject is able to perform for a short time; 40% of this value indicates the energy expenditure that is compatible with protracted work. The test is simple, short, and reproducible; its physiological bases appear to be valid. The results expressed in calories or in metabolic units permit easy comparison with the energy requirement of various muscular activities.

A65-82357
PHYSIOLOGY OF EUSTACHIAN TUBE [PHYSIOLOGIE DE LA TROMPE D'EUSTACHE].
G. Bremond and Proust
Journal Francais d'Oto-Rhino-Laryngologie et Chirurgie Maxillo-Faciale, vol. 14, Jan.–Feb. 1965, p. 21–36. In French.

An analytical study is presented of the methods used to study the function of the eustachian tube including (1) direct methods (manometric procedures, use of pneumatic chambers with regulated pressure), and (2) indirect methods (study of hearing changes due to endotympanic pressure variations, study of tympano-ossicular impedance variations during pressure changes in the middle ear). The results obtained by functional exploration of the eustachian tube are reviewed. These deal with (a) the aerodynamic role of the eustachian tube, studying the circulation of rhino-pharyngeal air towards the ear, of the ear towards the rhino-pharynx, and of the endo-tympanic pressure, as well as study of the mechanisms of tubal closure and opening; (b) the role of the eustachian tube in protection of the middle ear (by physiological occlusion, and by acting as a valve); and (c) the effect of the eustachian tube on general hearing and on the middle and internal ear.

A65-82358
STUDIES OF OXYGEN TOXICITY IN THE CENTRAL NERVOUS SYSTEM.
Lewis G. Zirkle, Jr., Charles E. Mengel, Betty D. Horton, and Edward J. Duffy (Duke U. Med. Center, Dept. of Med., Durham, N. C.; and Ohio State U., Dept. of Med., Columbus, Ohio).
(Aerospace Med. Assoc., Meeting, New York City, Apr. 28, 1965).
Aerospace Medicine, vol. 36, Nov. 1965, p. 1027–1032. 46 refs.

Mice of varying tocopherol status were exposed to oxygen under high pressure. Clinical features of oxygen toxicity in the central nervous system (seizures and death) correlated with lipid peroxidation of brain tissue which was associated with inhibition of brain acetylcholinesterase activity. Clinical and biochemical effects of hyperoxia were exaggerated in tocopherol deficient mice and were prevented by prior supplementation with tocopherol, a specific inhibitor of lipid peroxidation. It is postulated that the primary effect of hyperoxia on the central nervous system is peroxidation of brain lipid which directly or indirectly (through interference with other metabolic systems) results in cell and tissue damage.

A65-82359
METHOD FOR DETERMINATION OF CALCIUM IN SERUM, PAROTID FLUID AND URINE IN THE WEIGHTLESS STATE.
Bruce A. Butcher, Joseph F. Eastis, and Dale A. Clark (USAF School of Aerospace Med., Physiol. Chem. Sec., Brooks AFB, Tex.)
(Aerospace Med. Assoc., Meeting, New York City, Apr. 27, 1965).
Aerospace Medicine, vol. 36, Nov. 1965, p. 1032–1035. 9 refs.

Since the Manned Orbiting Laboratory program includes onboard monitoring of calcium metabolism, a method suitable for this determination under conditions of weightlessness has been investigated. Most techniques for calcium assay that are used at the present time have certain disadvantages that would preclude their use under conditions of weightlessness whereas the nuclear fast red (NFR) technique of Baar, as modified by Kingsley and Robnett, is simple, and all steps in the procedures are compatible with performance in the weightless state. The possible interference of magnesium, hemolysis, and protein was investigated. These effects should be minimal unless drastic changes in magnesium and/or protein levels should occur. The interference by hemolysis may be obviated by the use of a proper blank. The method has been adapted to an apparatus to effect mixing in the weightless state and is regarded as a practicable first-generation method for monitoring calcium metabolism.

A65-82360
STUDIES OF THE MECHANISM OF IN VIVO RBC DAMAGE BY OXYGEN.
Charles E. Mengel, Lewis G. Zirkle, Bert W. O'Malley, and Betty D. Horton (Duke U. Med. Center, Dept. of Med., Durham, N. C.; and Ohio State U., Columbus, Ohio).
Aerospace Medicine, vol. 36, Nov. 1965, p. 1036–1041. 47 refs.
Grants PHS CA-06543, CA-08170, HE-07696, and CRTY-5042.

Erythrocytes of dogs exposed to oxygen under high pressure showed initiation of in vivo peroxidation of erythrocyte lipid, increased osmotic fragility and decreased acetylcholinesterase activity. There were no gross evidences of hemolysis although additional studies indicated that a small population of red cells have been lost during in vivo OHP. No changes of the usual oxido-reduction transformation systems were noted. In vitro studies showed that acetylcholinesterase was not inhibited by oxygen per se (at normal or increased pressures) but was inhibited by addition of preformed lipid peroxides. These studies suggest a role of acetylcholinesterase inhibition in the damage to red cells by hyperoxia, and demonstrate that this enzyme can be inhibited by lipid peroxides in vitro and probably in vivo.

A65-82361
EFFECTS OF CONTROL-DISPLAY DISPLACEMENT FUNCTIONS ON PURSUIT AND COMPENSATORY TRACKING.
Edward C. Wortz, A. C. McTee, W. F. Swartz, T. W. Rheinlander, and W. A. Dalhamer (Garrett Corp., AirRes. Manuf. Co., Los Angeles, Calif.)
Aerospace Medicine, vol. 36, Nov. 1965, p. 1042–1047. 5 refs.

An experiment was conducted to determine optimal control display relationships in a generalized tracking task. This report contains a description of the experimental conditions, procedures and results of the experiment. Conclusions are drawn about the preferred type of display, control display displacement function, temporal lag between operator input and feedback, and target display velocities. The conclusions are applicable to piloting and radar tracking operations.

A65-82362
SOME ASPECTS OF THE DYNAMIC BEHAVIOR OF AIRCREW BREATHING EQUIPMENT.
G. R. Allen, K. R. Maslen, and G. F. Rowlands (Roy. Aircraft Estab., Human Eng. Div., Farnborough, Great Britain).
(Aerospace Med. Assoc., Meeting, New York City, Apr. 27, 1965).
Aerospace Medicine, vol. 36, Nov. 1965, p. 1047–1053. 24 refs.

Techniques necessary for accurate measurement of dynamic pressure and flow are first described. The need for cyclic flow testing for regulator response is demonstrated from basic bioengineering considerations, and the British test is outlined. The usefulness of breathing simulators is discussed and an electronically-controlled machine developed at the Royal Aircraft Establishment, Farnborough, England described. British problems on instability in breathing equipment and the nature and cause of the phenomenon, are discussed. Instability is shown to be a function of the complete system, in which the impedance of the human respiratory system can play an important part. A technique for measuring this impedance is described, preliminary results are presented and pneumatic analogues to simulate impedance considered. Preliminary work is reported on subjective perception of pressure oscillations, Brief comment is made on improvement of system dynamic behaviour.

A65-82363
PLASMA FREE FATTY ACID CHANGES IN MAN DURING ACUTE COLD EXPOSURE AND NICOTINIC ACID INGESTION.
Peter G. Hanson, Robert E. Johnson, and George Engel (Ill. U., Dept. of Physiol. and Biophys., Human Environ. Res. Lab., Urbana).
Aerospace Medicine, vol. 36, Nov. 1965, p. 1054–1058. 18 refs.
Contract DA-49-193-MD 2222.

This study was designed to observe the effect of acute cold exposure on plasma free fatty acids (FFA) after oral ingestion of nicotinic acid. Four healthy male subjects (21–25 years) was studied in paired cold exposure and control periods for a total of twenty experiments during June and July, 1965. The conditions of cold exposure were : semi-nude for 100 min. at 2°C., following by 240 min. of recovery at 24°C., lightly clothed. Control periods covered an equal time span at 24°C. All experiments were conducted in a fasted state with water ad lib. Nicotinic acid was taken 10 min. prior to the beginning of the periods for which it was scheduled. In addition to plasma FFA, the following measurements were made: plasma glucose, plasma total ketones, urinary vanillmandelic acid and respiratory metabolism. Collected data show that nicotinic acid strongly suppresses ($P < 0.1$) plasma FFA concentration during acute cold exposure in contrast to the usual increase in plasma FFA which is observed with cold exposure while fasting. This action significantly reduces the availability of FFA as a metabolic substrate at a time of increased requirement for energy metabolism. There is a suggestion that gross oxygen consumption is concomitantly reduced during cold exposure periods following nicotinic acid ingestion.

A65-82364
COMPARATIVE STUDIES ON 1285 AND 2800 MC/SEC PULSED MICROWAVES.
M. Michaelson, R. A. E. Thomson, and Joe W. Howland (Rochester U., School of Med. and Dentistry, Dept. of Radiation Biol., N.Y.)
(Aerospace Med. Assoc., 36th Ann. Meeting, New York City, Apr. 27, 1965).
Aerospace Medicine, vol. 36, Nov. 1965, p. 1059–1064. 18 refs.
Contracts AEC W-7401-ENG-49 and AF 30(602)-224.

Response of dogs exposed to 2800 Mc./sec. and 1285 Mc./sec. microwaves reveals a direct correlation between field intensity and body weight loss which is similar at both frequencies, at comparable field intensities. The degree and onset of leukocyte and erythrocyte increases and/or decreases, are dependent on microwave frequency, field intensity and duration of exposure. Reticulocytosis during daily 20 mW/cm.^{2}, 1285 Mc./sec. exposures indicates an hematopoietic effect. Signs of distress are less evident at 1285 Mc./sec. than at 2800 Mc./sec. when critical rectal temperature level (106° F. or greater) is reached, and suggest that potential microwave hazards may be obscure at the lower frequency.

A65-82365
SOME OBSERVATIONS ON DOGS FOLLOWING LOWER BODY EXPOSURE TO 1000 KVP X-RAYS
Lawrence T. Odland and Sol M. Michaelson (Rochester U., N. Y.)
Aerospace Medicine, vol. 36, Nov. 1965, p. 1064–1068. 15 refs.
AEC and Defense Atomic Support Agency supported research.

Studies with dogs given varying doses of 1000 KVP X-rays to the lower body indicated that the 60-day median lethal dose is about 920 roentgen; the limiting factor being the sensitivity of intestinal mucosa cells rather than those of the hematopoietic system. The acute clinical phase of lower body radiation injury is much shorter than with whole or upper body exposures, suggesting the gut and/or other abdominal viscera have a rapid component of total body recovery potential as opposed to primarily hematopoietic damage where recovery is much prolonged. Anorexia, weight loss, vomiting and hypersialosis were the most significant clinical changes, and these appeared immediately post-exposure persisting for 5–10 days. Fractionation of the single doses into four equal components given during brief sessions over as many consecutive days, decreased morbidity and mortality. Erythropoeisis was relatively unimpaired by the exposure of only the lower body.

A65-82366
EXAMINATION OF "ORGANIZED ELEMENTS" FROM THE ORGUEIL METEORITE BY QUANTITATIVE FLUORESCENCE MICROSCOPY.
Edward A. Botan (Avco Corp., Wilmington Mass.)
Aerospace Medicine, vol. 36, Nov. 1965, p. 1069–1076. 34 refs.

The organized elements of the Orgueil Meteorite were examined by quantitative fluorescence microscopy. An effort was made to correlate possible morphology with the presence of the amino acid, tyrosine. Relative tyrosine levels were determined by the formation of fluorescent complexes between the tyrosine present and 1-nitroso-2-naphthol. The fluorescence levels produced by the tyrosine-nitroso napthol complexes from lab cultures of microorganisms, microorganisms from peat, and the organized elements of meteorites were compared and used as an index of relative tyrosine content.

A65-82367
EFFECTS OF MODERATE PHYSICAL EXERCISE DURING FOUR WEEKS OF BED REST ON CIRCULATORY FUNCTIONS IN MAN.
Perry B. Miller, Robert L. Johnson, and Lawrence E. Lamb (Aerospace Med. Div., USAF School of Aerospace Med., Brooks AFB, Tex.)
Aerospace Medicine, vol. 36, Nov. 1965, p. 1077–1082. 13 refs.

Various effects on circulatory functions of light to moderate physical exercise during 4 weeks of bed rest were studied in 6 subjects. During exercise narrow cuffs inflated to 60 mm. Hg were worn on the upper thighs. Changes in plasma volume during and after bed rest paralleled those characteristic of simple bed rest. In contrast to simple bed rest, the major loss of red cell mass was noted at the end of bed rest and not during ambulation following bed rest. The mean resting heart rate for all subjects increased 15 beats per min. during bed rest. The degree of postural intolerance after bed rest appeared as marked as that observed after absolute bed rest. Physical endurance on the treadmill was decreased after bed rest.

A65-82368
EVALUATION OF PEAK VS. RMS ACCELERATION IN PERIODIC LOW FREQUENCY VIBRATION EXPOSURES.
N. P. Clarke, G. C. Mohr, J. W. Brinkley, J. H. Henzel, H. E. von Gierke (Aerospace Med. Div., Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio), P. J. Martin, and H. C. Wooding (Technol. Inc., Dayton, Ohio).
Aerospace Medicine, vol. 36, Nov. 1965, p. 1083–1089. 6 refs.
Contract AF 33(615)-1894.

Subjects were exposed to vibrations with varying peak and Root Mean Square (RMS) accelerations and frequencies to explore the relative importance of these parameters in determining the effect of the vibration produced by turbulence in low altitude high speed flights. For various RMS acceleration levels and frequency contents, pairs of periodic vibration exposures having the same RMS but different peak accelerations were evaluated using both a subjective severity rating and a measure of vibration induced hand motion. The higher peak acceleration of the various pairs having the same RMS values was subjectively rated more severe in 32 of 40 observations. However, when attempting to hold the hand in a fixed position during vibration, the induced deviations from the null point, expressed either as average or peak-to-peak errors appeared to depend more on RMS acceleration and frequency than on the small differences in peak acceleration studied here.

A65-82369
EFFECT OF HYPOXIC HYPOXIA ON NYSTAGMUS INDUCED BY ANGULAR ACCELERATION.
P. D. Newberry, W. H. Johnson, and J. R. Smiley (RCAF Inst. of Aviation Med., Toronto, Ontario, Canada).
Aerospace Medicine, vol. 36, Nov. 1965, p. 1090–1093. 13 refs.

Four subjects were exposed to a horizontal angular acceleration of approximately 156° sec.$^{-2}$ for one second, while breathing air at ground level, and then while breathing air at 20,000 feet. On a different day the angular acceleration was repeated while breathing 10 per cent oxygen at ground level, and then while breathing air at ground level. Total slow phase angular deviation of the eye, maximum slow phase angular velocity and total duration of nystagmus were used as criteria of the magnitude of the nystagmic response. There was a mean increase of 61% in the slow phase angular velocity of the nystagmus occurring while breathing 10% oxygen compared with breathing air at ground level. At 20,000 feet, however, there was a mean increase of almost 100% in total angular deviation, maximum angular velocity and total duration of nystagmus compared to breathing either 10% O_2 or air at ground level. This is attributed to the obvious anxiety displayed by the subjects at 20,000 feet. It is suggested that hypoxic hypoxia and the associated hyperventilation cause a trivial increase in the nystagmus resulting from a horizontal angular acceleration without hypoxia but that apprehension may cause a profound increase in nystagmus.

A65-82370
HUMAN FACTORS IN THE CONCORD S. S. T.
G. Bennett (Min. of Aviation, London, Great Britain).
(Aerospace Med. Assoc., Meeting, New York City, Apr. 26, 1965).
Aerospace Medicine, vol. 36, Nov. 1965, p. 1094–1096.

Human factors investigations in the Concord program are described and discussed. The Concord is a narrow delta-winged supersonic transport aircraft with capability of ascending to a maximum altitude of about 65,000 ft. Among the problems created by the high-cruising are the following: (1) pressurization failure, (2) ozone concentration, (3) cosmic radiation, (4) solar flares, (5) ultraviolet light, (6) high temperature, and (7) noise. The high forward speed contributes to angular accelerations which are kept limited, however because of passenger-comfort considerations. Disturbances of circadian rhythm are to be expected because the high speed facilitates crossing several time zones during a duty day. Crew scheduling is being studied to minimize such disturbances. The need for physiological training in pressure breathing (possibly eliminating some older pilots) and safety features of the Concord are also discussed.

A65-82371
MAXILLARY SINUS DISEASE IN AVIATORS.
Frederick W. Fascenelli, Charles Randolph, Jr., and Alfred Hamilton (Aerospace Med. Div., USAF School of Aerospace Med., Flight Med., Radiol. and ENT Branch, Brooks AFB, Tex.)
Aerospace Medicine, vol. 36, Nov. 1965, p. 1096–1098. 11 refs.
NASA Contract T 16765 (G).

A study investigating the correlation between exposure to trauma and incidence of asymptomatic maxillary sinus disease is presented. Two-hundred and eleven Air Force officers were selected at random by major air command for participation in the study. Radiographic indication of evidence of maxillary sinus disease was compared with exposure to barotrauma as expressed in total flying time. The incidence of disease as related to age was also studied. The results indicated the following: (1) that there is no evidence for a correlation between age and frequency of the sinusitis condition, and (2) that the latter condition is independent of exposure to barotrauma as expressed in total flying time and should no longer be looked upon as an occupational hazard of the aviator.

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